



FRIDAY, MARCH 24.

Train Accidents in February.

The following accidents are included in our record for the month of February:

REAR COLLISIONS.

On the afternoon of the 2d a passenger train on the Eastern road ran into the rear of a freight train which was shifting in the yard at Lynn, Mass. The engine and two cars were badly broken.

On the evening of the 4th a coal train on the Philadelphia & Reading road ran into the rear of another coal train near St. Nicholas, Pa., wrecking several cars.

On the night of the 5th an express train on the New York Central & Hudson River road ran into a snow-plow near Poughkeepsie, N. Y., and the engine was damaged. A brakeman was hurt.

Very early on the morning of the 7th a freight train on the Philadelphia & Reading road broke in two near Barnesville, Pa., and the rear section ran into the forward one, wrecking several cars.

On the morning of the 8th a freight train on the Chicago, St. Paul, Minneapolis & Omaha road ran into a preceding freight at Hammond, Wis., wrecking an engine and five cars. The cars caught fire and were burned up. The engineer was hurt.

Very early on the morning of the 9th a freight train on the Pennsylvania Railroad ran into the rear of a preceding freight which had been wrecked a few minutes before near Huntingdon, Pa. Several cars and the engine were badly broken. This was the third of a chain of three accidents within a few minutes.

On the afternoon of the 9th a passenger train on the Central Railroad of New Jersey ran into the rear of a coal train at Hauto, Pa., wrecking several cars and damaging the engine. A brakeman was hurt. The coal train had been delayed by snow.

On the night of the 11th a freight train on the Virginia Midland road ran into the rear of a preceding freight near Springfield, Va., damaging an engine and several cars. The fireman was hurt.

On the afternoon of the 13th a freight train on the New York, Lake Erie & Western road ran into the rear of another freight which had stopped to take water at Shin Hollow, N. Y. The pusher engine at the rear end of the first train and several cars were badly damaged.

On the afternoon of the 15th the pay train on the Valley road ran into a freight train in Akron, O., wrecking a flat car, killing one trainman and injuring three others.

On the morning of the 17th a freight train on the Providence & Worcester road ran into some cars which had broken loose from a preceding freight near Woonsocket, R. I. The engine and 10 cars were badly broken and the engineer hurt.

On the afternoon of the 18th a passenger train on the Denver & Rio Grande road ran into the rear of a freight at Marshall Pass, Col. An engine and several cars were wrecked and three trainmen hurt.

On the night of the 20th a freight train on the Lake Shore & Michigan Southern road ran into a preceding freight near Warren, Ind., wrecking an engine and several cars and injuring a brakeman.

Early on the morning of the 22d a freight train on the Pennsylvania Railroad ran into the rear of a preceding freight near Irwin, Pa., wrecking the caboose and killing a brakeman.

On the morning of the 22d a passenger train on the St. John & Maine road ran into another passenger train which was backing into a siding at Grand Bay, N. B. A snow-plow and an engine were badly broken.

On the afternoon of the 25th a freight train on the Central Pacific road ran into some stock cars which had been left on the main track at Merced, Cal. The engine and several cars were wrecked and a brakeman killed.

Very early on the morning of the 26th a freight train on the Michigan Central road broke in two near Lapeer, Mich., and the rear cars ran into the forward ones. Five of the cars were filled with sulphuric acid for use in the copper region to which they were billed. The concussion when the train came together broke some of the glass bottles containing the acid, which were inclosed in large casks. The fluid ran out and set the cars on fire, and they were partially destroyed.

On the morning of the 28th a Wisconsin Central freight train ran into the rear of a Chicago, Milwaukee & St. Paul freight, which had stopped at a siding on the St. Paul track, near Milwaukee, Wis. The engine and several cars were badly broken and a brakeman killed.

On the morning of the 28th a passenger train on the Illinois Central road ran into the rear of a freight near Homewood, Ill. The engine and several freight cars were damaged and the engineer hurt.

BUTTING COLLISIONS.

On the evening of the 6th there was a butting collision between a passenger and a freight train on the Intercolonial road near Windsor Junction, N. S. Both engines and several coal cars were wrecked, a fireman killed, a conductor and a brakeman hurt.

On the night of the 8th there was a butting collision between two freight trains on the Southern Pacific road near San Geronio, Cal. Both engines and 30 cars were piled up together in a very bad wreck.

On the night of the 10th there was a butting collision between two freight trains on the Pittsburgh, Ft. Wayne & Chicago road near Plymouth, Ind., by which both engines and 14 cars were wrecked. The accident was caused by a misunderstanding of orders.

On the evening of the 11th there was a butting collision between a freight and a passenger train on the New York & New England road near Natick, R. I. Both engines were damaged, an engineer and a fireman hurt. There was a blinding snow-storm at the time.

On the night of the 11th there was a butting collision between two freight trains on the Cincinnati Southern road near Kismet, Tenn. An engineer was hurt.

On the afternoon of the 14th there was a butting collision between passenger trains on the Bradford, Bordell & Kinzua road near Bradford, Pa., doing some damage.

On the morning of the 17th there was a butting collision between a freight train and a yard engine on the Lake Shore & Michigan Southern road at Air Line Junction, O. Both engines were badly broken and one engineer fatally hurt.

Very early on the morning of the 19th there was a butting collision between two freight trains on the Atlanta & Charlotte Air Line road near Gainesville, Ga. Both engines and several cars were wrecked and five cars burned up. An adjoining trestle was also burned. Both engineers and both firemen were hurt.

Very early on the morning of the 21st there was a butting

collision between two freight trains on the Chicago & Northwestern road near Winetka, Ill. Both engines and several cars were badly broken.

On the morning of the 21st there was a butting collision between two freight trains on the Cincinnati Southern road near Sunbright, Tenn., caused by a dispatcher's mistaken order. Both engines were damaged, an engineer killed and a fireman badly hurt.

On the afternoon of the 26th there was a butting collision between two freight trains on the St. Paul, Minneapolis & Manitoba road near Alexandria, Minn. Both engines and several cars were wrecked, an engineer was hurt, and a man who was walking on the track was also hurt.

Very early on the morning of the 28th four cars broke loose from a switching freight train on the Chicago, Burlington & Quincy road at Opheim, Ill., and ran back at a great speed down a grade and into the head of another freight. The engine and 15 cars were piled up in a very bad wreck, and the fireman killed.

CROSSING COLLISION.

On the morning of the 28th a New York Central & Hudson River freight train ran into a Rome, Watertown & Ogdensburg freight at the crossing just north of Syracuse, N. Y. The Central engine was thrown down a bank into Onondaga Lake, and several freight cars were wrecked. The wreck caught fire and 15 cars were burned up.

DERAILMENT, BROKEN RAIL.

On the morning of the 8th the engine and one car of a passenger train on the Missouri Pacific road were thrown from the track near Eliah, Mo., by a broken rail. The fireman was hurt.

DERAILMENT, DEFECTIVE FROG.

On the afternoon of the 3d the engine and two cars of a passenger train on the Cincinnati, Indianapolis, St. Louis & Chicago road were thrown from the track at Montmorency, Ind., by a defective frog.

DERAILMENTS, SPREADING OF RAILS.

Very early on the morning of the 2d a passenger train on the Louisville & Nashville road was thrown from the track near Creek Bridge, Ala., by the spreading of the rails.

On the morning of the 11th three cars of a passenger train on the Wheeling & Lake Erie road were thrown from the track near Huron, O., by the spreading of the rails, and went down a bank into the Huron River. The conductor and eight passengers were hurt.

On the morning of the 14th two cars of a passenger train on the New York & New England road were thrown from the track in Springfield, Mass., by the spreading of the rails.

On the afternoon of the 16th seven cars of a freight train on the Louisville & Nashville road were thrown from the track near Nortonville, Ky., by the spreading of the rails. The track was under water at the time.

DERAILMENTS, BROKEN BRIDGE.

On the morning of the 8th a passenger train on the Texas & Pacific road broke through a bridge near Dodd, Tex., and went down into the creek. The fireman and two passengers were killed.

On the morning of the 16th a coal train on the Delaware, Lackawanna & Western road broke through an iron bridge at Bell's Bridge, near Stroudsburg, Pa. About half the train went down into the creek, falling nearly 50 feet. A brakeman was slightly hurt. The bridge was an iron bridge of three spans, one of 91 ft., the others of 144 ft. each, and was built about 10 years ago.

On the afternoon of the 18th the engine of a freight train on the Pittsburgh & Lake Erie road broke through a trestle in Pittsburgh, Pa., and fell to the ground. The engineer was killed and the fireman fatally hurt.

On the morning of the 23d a freight train on the Illinois Central road ran upon a partly washed-out bridge near Vandalia, Ill., and went down into the Kaskaskia River. The conductor and a brakeman were drowned.

DERAILMENTS, BROKEN WHEEL.

On the morning of the 2d a car in a mixed train on the North Brookfield Branch of the Boston & Albany road was thrown from the track near East Brookfield, Mass., by a broken wheel.

On the morning of the 13th five cars of a freight train on the Rensselaer & Saratoga road were thrown from the track near Schenectady, N. Y., by a broken wheel. The caboose caught fire and was destroyed.

DERAILMENTS, BROKEN AXLE.

Very early on the morning of the 9th several cars of a freight train on the Pennsylvania Railroad were thrown from the track near Huntingdon, Pa., by a broken axle. The wreck of one of the cars was thrown over on the opposite track directly in front of another train. This accident caused two others within a few minutes.

On the morning of the 16th several cars of a freight train on the New York Central & Hudson River road were thrown from the track near Tarrytown, N. Y., by a broken axle.

On the morning of the 18th 23 cars of a coal train on the Pennsylvania Railroad were thrown from the track at Monmouth Junction, N. J., by a broken axle. A brakeman was hurt.

On the evening of the 28th six cars of a coal train on the New York, Lake Erie & Western road were thrown from the track near Shohola, Pa., by a broken axle.

DERAILMENT, BROKEN TRUCK.

On the evening of the 6th the engine of a passenger train on the Central Pacific road was thrown from the track near Teal, Cal., by the breaking of the truck.

DERAILMENTS, SNOW.

On the morning of the 5th a snow-plow and engine on the Central Railroad of New Jersey, ran off the track in South Amboy, N. J., in a heavy drift.

On the morning of the 6th a snow-plow and two cars of a passenger train on the Boston & Albany ran off the track at Allston, Mass., in a snow drift.

DERAILMENTS, WASH-OUTS AND LAND-SLIDES.

On the morning of the 13th a freight train on the Western Maryland road ran into a land-slide near Rocky Ridge, Md., and the engine was thrown from the track and damaged. The engineer was slightly hurt.

On the morning of the 23d the locomotive of a passenger train on the Pittsburgh & Western road went into a wash-out at Herr's Island in Allegheny, Pa., and was damaged.

On the morning of the 23d a yard engine on the Louisville, Cincinnati & Lexington road ran into a wash-out in Louisville, Ky., falling 30 feet into the gap. Six men, who were on the engine, were hurt.

On the night of the 24th the pay train on the Richmond & Allegheny road ran into a land-slide near Buchanan, Va., and the engine and pay car were thrown from the track and down a bank into the James River. The Paymaster's clerk was killed; the engineer, the conductor, the Division Superintendent, the Road-Master and a contractor, who were on board, were hurt.

DERAILMENT, MAN RUN OVER.

On the afternoon of the 28th a man who was attempting

to board a Chicago & Northwestern train at Glendale, Minn., was thrown under the wheels of a car. The man was fatally hurt and six cars were thrown from the track.

DERAILMENTS, ACCIDENTAL OBSTRUCTION.

Very early on the morning of the 9th a freight train on the Pennsylvania Railroad struck the wreck of a box car which had been thrown over from the opposite track, near Huntingdon, Pa., a minute before. The engine went down a high bank and was wrecked, killing the engineer and conductor and fatally injuring a fireman. This was the second of three accidents within a few minutes.

Very early on the morning of the 17th a freight train on the New York Central & Hudson River road struck a rock which had rolled on the track near Stuyvesant, N. Y., and the engine and 10 cars were thrown from the track, blocking the road five hours.

DERAILMENTS, MISPLACED SWITCH.

On the morning of the 10th the engine of a passenger train on the Pennsylvania Railroad was thrown from the track in Allegheny, Pa., by a misplaced switch.

On the afternoon of the 18th the engine of a freight train on the Philadelphia, Wilmington & Baltimore road was thrown from the track in Wilmington, Del., by a misplaced switch.

Very early on the morning of the 21st a passenger train on the Chicago & Northwestern road was thrown from the track near Elroy, Wis., by a misplaced switch, blocking the road four hours.

On the evening of the 28th the engine of a freight train on the East Tennessee, Virginia & Georgia road was thrown from the track in Dalton, Ga., by a misplaced switch.

MALICIOUS DERAILMENTS.

On the night of the 6th the engine and one car of a passenger train on the Carolina Central road were thrown from the track at Brevard, N. C., by a switch which had been purposely misplaced.

On the night of the 9th a freight train on the Louisville, Cincinnati & Lexington road was thrown from the track near Eagle, Ky., by a car door, which had been put on the track by persons unknown.

UNEXPLAINED DERAILMENTS.

On the night of the 1st three cars of a freight train on the New York, New Haven & Hartford road ran off the track near Newington, Conn., blocking one track five hours.

On the evening of the 2d four cars of a freight train on the Pennsylvania Railroad were thrown from the track near Greensburg, Pa., blocking the road four hours.

On the morning of the 6th the engine of a coal train on the Philadelphia & Reading road ran off the track in the yard at Tamaqua, Pa., and ran into the wall of the machine shop, knocking down 30 feet of it.

On the morning of the 8th five cars of a freight train on the New York Central & Hudson River road jumped the track in Buffalo, N. Y., and two of them upset.

On the 8th a freight train on the Peoria, Decatur & Evansville road ran off the track near Newton, Ill., and nine cars were badly broken.

On the night of the 8th a freight train on the Cincinnati, Hamilton & Dayton road ran off the track near Kirkwood, O., and seven cars went into the ditch.

On the morning of the 9th 15 cars of a freight train were thrown from the track near Little Rock, Ark., on the St. Louis, Iron Mountain & Southern road.

On the morning of the 10th two cars of a freight train on the New York Central & Hudson River road ran off the track at Palatine Bridge, N. Y., delaying trains three hours.

On the morning of the 11th two cars of a freight train on the Louisville & Nashville road ran off the track in Pensacola, Fla., doing a little damage.

On the night of the 11th a car of a freight train on the Pittsburgh, Cincinnati & St. Louis road jumped the track at Wheeling, W. Va. In putting it on again the car upset and two trainmen were hurt.

On the morning of the 12th a freight train on the Louisville, New Albany & Chicago road ran off the track near Lafayette, Ind. The conductor was hurt.

Very early on the morning of the 14th several cars of a freight train on the Pennsylvania Railroad were thrown from the track at Millham Junction, N. J. A brakeman was hurt.

On the afternoon of the 15th a freight train on the Connecticut River road ran off the track near Smith's Ferry, Mass.

Shortly after the rear car of a passenger train jumped the track, while the train was trying to switch around the wreck.

On the morning of the 16th a freight train on the Rensselaer & Saratoga road ran off the track near East Line, N. Y., and five cars were wrecked.

On the night of the 16th some cars of a freight train on the New York, New Haven & Hartford road ran off the track near Mt. Vernon, N. Y., killing a brakeman and injuring the conductor. The road was blocked five hours.

On the morning of the 21st several cars of a freight train on the Memphis & Charleston road were thrown from the track near Buntyn, Tenn., and some of them were badly broken.

On the afternoon of the 24th a freight train on the Chicago, Burlington & Quincy road ran off the track near Savannah, Ia., and the engine and several cars were piled up in a bad wreck.

On the afternoon of the 28th six cars of a freight train on the Louisville & Nashville road ran off the track near Hopkinsville, Ky., doing some damage.

On the night of the 28th a car of a freight train on the Chicago & Alton road ran off the track and upset near Joliet, Ill. The car was loaded with brick and 10 tramps; two of the latter were killed and five hurt.

BOILER EXPLOSIONS.

On the afternoon of the 1st the engine of a passenger train on the Old Colony road exploded its boiler when near Wood's Holl, Mass., tearing the forward end of the engine to pieces.

On the evening of the 20th a freight engine on the Wash, St. Louis & Pacific road exploded its boiler while standing in the round-house at Peoria, Ill. The engine was torn to pieces, the round-house wrecked, damaging 15 engines and injuring seven men in the round-house.

OTHER ACCIDENTS.

On the afternoon of the 9th the engine of a coal train on the Central Railroad of New Jersey, broke a driving axle when near Plainfield, N. J. The wheel flew off, tearing out the rods on that side. The fireman was hurt.

On the night of the 21st a large rock fell from the bank in a cutting on the New York Central & Hudson River road near Crugers, N. Y., just as a passenger train was passing. The rock fell upon the engine, wrecking it badly, and injuring the engineer and fireman slightly.

This is a total of 88 accidents, in which 23 persons were killed and 69 injured. Seventeen of the killed and 52 of the injured were railroad employes, that is, trainmen, while 6 of the killed and 17 of the injured were passengers.

As compared with February, 1881, there was a decrease

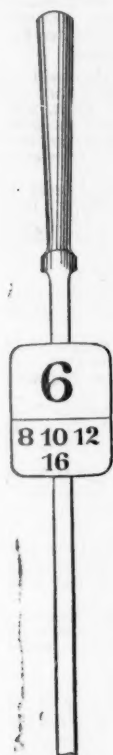


Fig. 3.

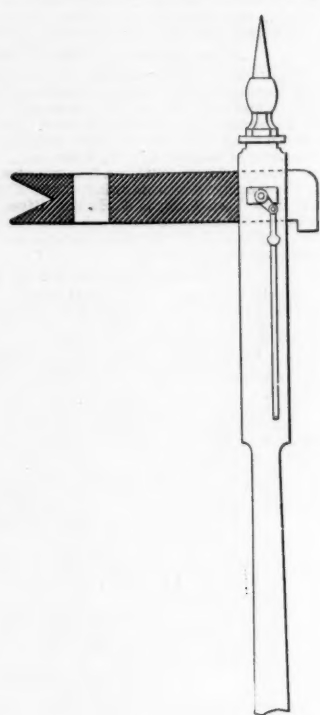


Fig. 4.

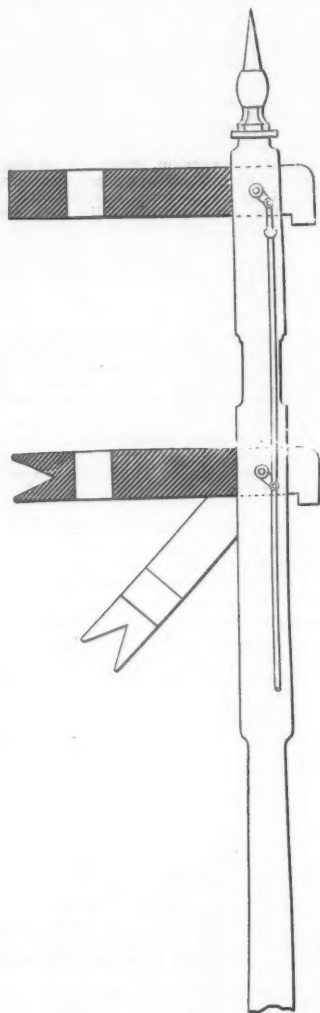


Fig. 5.

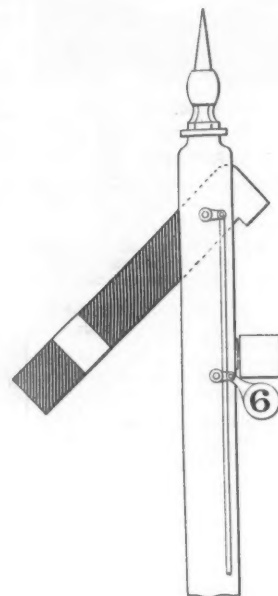


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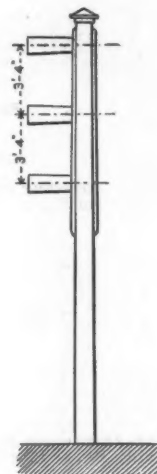


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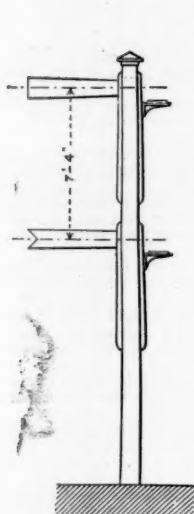


Fig. 8.

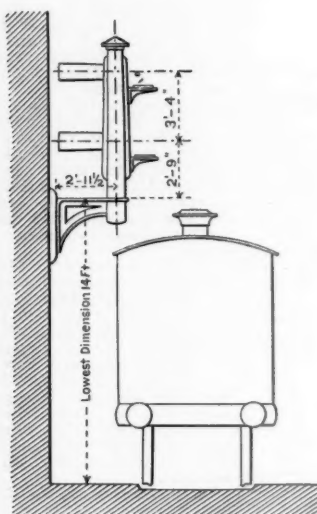


Fig. 9.

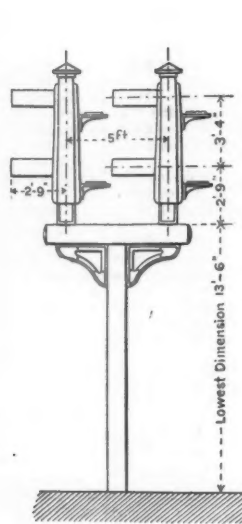


Fig. 10.

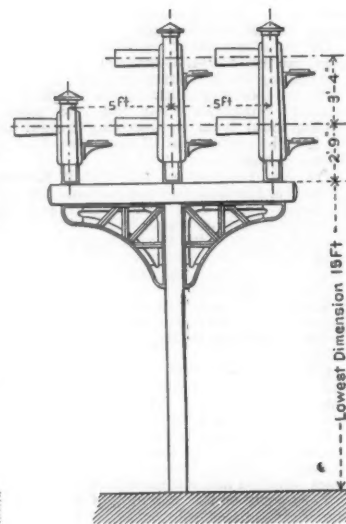


Fig. 11.

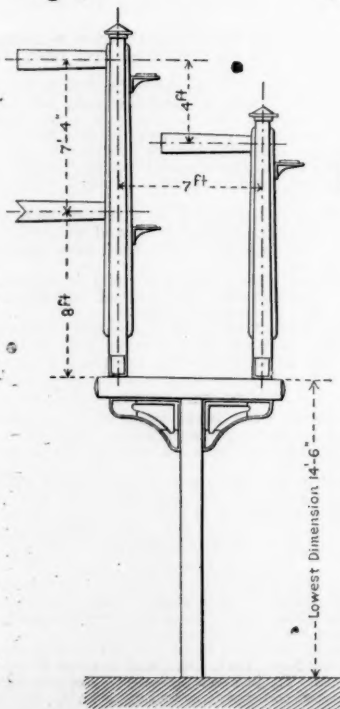


Fig. 12.

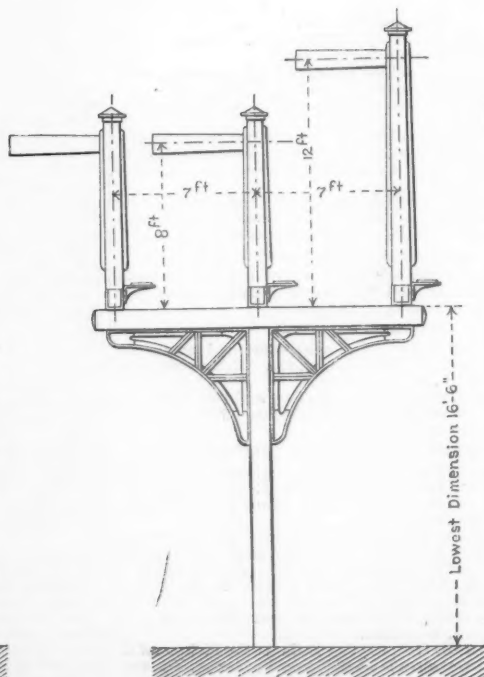


Fig. 13.

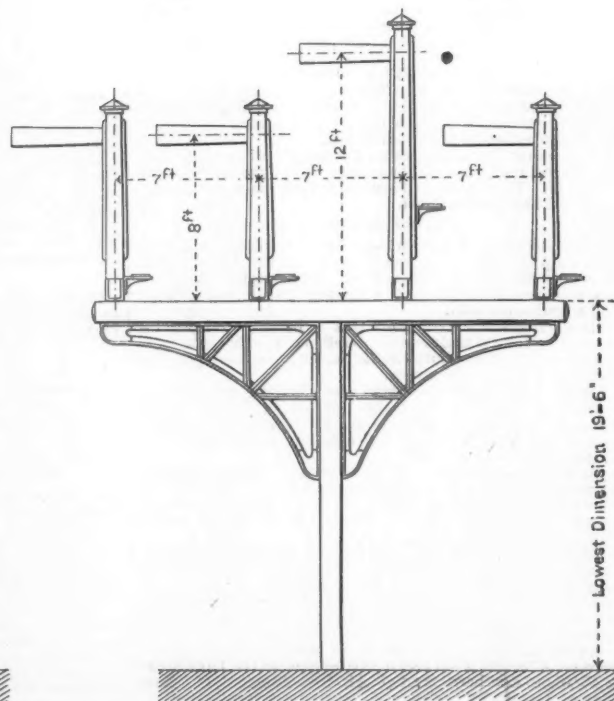


Fig. 14.

of 61 accidents, of four killed and of 184 injured; a very great change.

The totals for the two months of 1882 are 225 accidents, 64 killed and 267 injured, the monthly averages being 113 accidents, 32 killed and 134 injured. These are below the monthly averages for 1881, but not more than might have been expected.

Contributions.

English Railroad Signals.

BY CHARLES R. JOHNSON.

I now come to the working of the switches and signals at stations, sidings and junctions, and the necessary interlocking machinery to work them with safety, speed and economy. It is very generally supposed that the system of interlocking causes delay to traffic by taking longer to perform shifting operations, but it is found by experience in England that much more work can be got through by a smaller number of men with the interlocking than without it, always provided that the yards are reasonably well laid out, and that they are properly signaled. In many yards in this country there is a great number of switches that are useless, having been put in for special purposes and not taken out when no longer required. It is a very necessary point for both economy and simplicity in working to have just as many switches as may be required for the traffic and no more.

The first point in arranging to work a yard on the interlocking system is to concentrate as much as possible all the switches, so that one machine and one man can actuate as great a number as possible. It is found that one man can work a machine of 50 levers almost as readily as one of 20 levers, hence the importance of concentrating the switches.

There are several kinds of locking apparatus manufactured, but those are generally conceded to be the best in which the action of the locking is performed by means of the catch-rod that holds the lever in position. This is termed "preliminary action of the locking-gear," as the act of lifting the catch to release the lever from its notch performs the necessary locking, and thus it is done before the lever can be free from the notch in which it is firmly held. By this means there is no undue strain put upon the locking through pulling a wrong lever, and no danger is to be apprehended from the wearing of locks.

In setting out the interlocking for a yard or station, it is usual in Great Britain to have two tables of locking prepared by separate qualified engineers, and before the machine is brought into operation, it is tested practically by a Board of Trade inspector. These precautions are very necessary, for however well qualified a person may be to arrange the interlocking of a yard, a slight mistake is easily made, not always so readily detected, and may lead to serious consequences. A certain number of spare levers are usually fixed in the apparatus for use in case of alterations or additions to the station or yard, and it is found more economical and convenient to have these levers in case of necessity than to have the trouble and expense of adding levers to an old apparatus when they may be required. Diagrams showing the yard and arrangement of switches and signals should be placed in the cabins, not only for convenience in testing the interlocking, but for the assistance of switchmen in learning the machine and for ready reference.

A name-plate or board is always placed behind the levers and gives a description of the work each lever has to perform. In addition to the number belonging to each lever, there is placed immediately below it, where necessary, the number or numbers of levers that precede the one to which they are attached. In the sketch attached (fig. 3) the large figure refers to No. 6 lever and the small ones intimate that 8, 10, 12 and 16 must be pulled before No. 6 can be given. This arrangement greatly assists the switchman in learning the various combinations of levers in the apparatus he is to work, and therefore facilitates the working of traffic, particularly when the system is first brought into operation, or when new switchmen are introduced.

The main line signals are named respectively "distant," "home," "stop or junction," "starting" and "advance," and are generally applied as follows:

Distants are distinguished from all others by having the ends of the arms or blades forked, as shown in fig. 4, and are the only ones that engineers are permitted to pass under certain circumstances when at the danger position. They are worked to the "danger" and "all right" positions, and in Great Britain show respectively red and white lights. I am glad to see that in this country green lenses have been introduced to take the place of red ones for distant signals, as this gives at night a distinction between home and distant signals, and is a great improvement. A small green spectacle is attached to the signal arm and arranged so as to cover, when at the "danger" position, a small lens in the back of the lamp for the purpose of indicating to switchmen at night the position of the arm, and if the light is burning properly. But this method is not found very reliable in the case of distant signals, as, in dull or foggy weather, nothing can be seen. Electric repeaters are now very generally introduced for this purpose, and can be relied upon to indicate the exact position of the arm, and also whether the lamp is burning.

Where it happens that the proper distance for a distant signal from the home throws it beyond the home signal of a station in the rear, it is formed by a lower arm on the home signal of the said station, and it is worked so that the distant arm can never be lowered without the home, but the home can be lowered without the distant. By this means the

danger of an engineman mistaking the home for the distant is avoided.

Fig. 5 shows such a home and distant signal on one post. The distant signal is always the lower arm, and it has the arm or blade forked as shown. The advantage of regulating the arms in the manner described will be readily seen: When the point of the track governed by the home signal is obstructed, there can be no advantage in showing the "all clear" signal by the distant arm of the cabin ahead, as the train is required to stop, and if the distant arm was lowered with the home at "danger," there would be the risk of enginemen mistaking "distant" for "home," and thus running into danger. On the other hand, when the home signal is lowered, the distant stands free to be actuated by the man working it, and in case of their being misunderstood there is no danger to fear.

The movement is performed by means of a fork-lever slot.

An ordinary slot is one by which two or more signalmen are enabled to control one arm, in which case anyone of them can put the arm to "danger;" but it requires all of them to lower it to "all right." Home signals were formerly slotted when necessary to protect stations, not being at sufficient distance to have separate distant signals without overlapping, but this gave rise to much inconvenience, through trains being stopped sooner than was necessary, and to some danger through the introduction of flag signaling. This difficulty was completely overcome by the introduction of the fork-lever slot.

Another method of controlling a distant signal mechanically is by means of a contrivance termed a "disengager," by means of which a distant signal at a rear station can be instantaneously changed from the "all right" to the "danger" position, and if at "danger," prevented from being taken off.

When it is desired to control a signal that is too far away to be worked mechanically, it is done by the electric slot, a patent in England of Messrs. Farmer & Tyer. This is an admirable adjunct to the ordinary block working, for by its means the starting signal at a distant station may be kept at "danger" until "line clear" has been given.

The distance of distant signals from their home should be regulated by the distance in which the heaviest trains using the track can be stopped during the worst weather, allowing considerable margin for safety, as there are many cases of accidents caused by enginemen being unable to stop after seeing danger signals displayed. The distant signals that I have seen in this country are not, as a rule, placed at a sufficient distance from the home to give safety.

Home, stop, or junction signals are signals that should never be passed by enginemen when at "danger," except with special instructions. They are usually placed a few yards in the rear of stations, junctions, switches, cross-over roads, level crossings, or other points at which obstruction may be expected on the track, and should be understood as indicating the point to which enginemen may draw up their trains when the signal is at "danger," but never beyond. Enginemen should not be called upon to exercise discretion in stopping at some distance before a signal. The home signal should just be placed at the position engines are required to stop.

Home signals are sometimes worked to the two positions "danger" and "caution," but much more frequently "danger" and "all right," showing at night respectively red and white lights to the engineman, and for back lights to the switchman green and white. Where the home or junction signal is placed to govern facing points, it is well to have it within a few yards of the switch and not at a considerable distance back, as in that case there is greater danger if any attempt is made to split the points. Some of the most terrible accidents on railroads in Great Britain have been caused by trains being split at facing points, or turned on to a wrong track when running at a high rate of speed. Facing switches may be always looked upon as a source of danger to traffic, unless properly locked in connection with signals. This is a danger that does not seem to be appreciated at its full value in this country, in consequence, I presume, of the accidents resulting therefrom not being very frequent. It must, however, be borne in mind that when facing switches are improperly set for the passage of a passenger train, the results are invariably most disastrous.

Grade crossings are places where it is sometimes advisable to place the home signal at a greater distance from the fouling point. These crossings, of which there are so many in this country, are now a constant source of danger and delay. By the introduction of the block and interlocking systems they may be made practically safe, and the passing of trains facilitated. The usual means adopted now for passing trains is by a flagman, whose duty is to be always on the look-out for trains and to flag them across in the order in which they arrive; and to do this he stands in the middle of the crossing and waves his flag, a signal that may just as readily be taken by two enginemen as one. Railroad authorities know the objections to this system too well to need recapitulation. With the block and interlocking systems the signalman is not exposed to the inclemency of the weather, and is in such position that he has the best view possible of the tracks; he has block communication with sections in every direction from which trains may come, and is thus enabled to make what arrangements are necessary to pass trains. Enginemen have distinct and decided signals to look for, and are in no uncertainty as to which track they will be turned if there are facing points.

I have heard it objected that where there is heavy traffic at crossings delays would be caused by interlocking, and that there would still be the danger of men reversing their signals in the face of trains.

With regard to the first objection I can only refer to England, where the heaviest traffic in the world is passed wholly with the use of interlocking. I have mentioned before that experience proves interlocking to be not only the safest but the quickest method of shifting traffic. As to the danger of men suddenly reversing their signals in the face of trains, it is simply impossible with block working, and even without the block, the record of accidents caused by it is very low.

At the entrance to yards where two or more signals are required to indicate which track the switches are set for, it is now usual to spread the signals laterally, as being much more easily understood than when several arms are placed on one post, or in cases where there is not sufficient space for this method; or the number would cause them to occupy such position as to be confusing; one arm is employed worked by the proper number of levers and having indicating numbers to show for which track the signal is lowered. For example, fig. 6 shows the arm lowered and the number 6 showing, which would indicate that the signal was lowered for a train to enter No. 6 siding or bay.

The starting signal, as the name implies, is used to start trains from terminal or roadside stations. At the latter it has the home and distant signals behind it to protect trains stopping at the station.

The advance signal is one placed at some considerable distance ahead of the starting signal, and is used to facilitate the movement of traffic by enabling track in rear to be more quickly cleared, or to protect outlying sidings; or to clear junctions by enabling trains to be drawn ahead on one track a certain distance into sections not yet cleared and leaving the other track free to be used.

Ground disk signals are now very generally used for siding and shunting signals and have usually red and green lights for night working. Purple lights have been introduced in some instances to take the place of the red, in order to prevent the possibility of enginemen taking them to be the tail lamp of trains, but the use of the red is almost universal.

I will say a few words in conclusion with regard to the working of switches and the switch locks that should always be fixed to every facing switch. The English Board of Trade regulations fix the limit of distance for facing switches at 450 ft. from the cabin. There is no exact distance laid down for trailing switches, but it is not found convenient to work them at a greater distance than 800 ft., not because there is any difficulty in so doing, but because of the difficulty a switchman has in seeing when a train is or is not clear of the switches.

Messrs. Saxby & Farmer's well known facing-point lock is now almost universally used wherever point switches are fixed. The use of this admirable lock insures that the points shall be properly set close home to the stock rail before the signal can be given for a train to pass. Any fracture or failure of the point connections is at once discovered; the points are wedged firmly and immovably in the position indicated by the signal given, and the ordinary jarring and jolting occasioned by passing trains is prevented, while a train actually traveling through the points is itself master of the situation, as not even the signalman can, either intentionally or inadvertently, change their position or disturb them until the whole train is safely passed.

There are several methods of controlling switches that are at too great a distance from cabin to be worked, the most perfect being by Annett's lock. (This was illustrated in the *Railroad Gazette* of July 12, 1878.) In this arrangement the siding switches it is desired to lock are coupled up to a single lever fixed by the side of the track and fitted with an Annett's safety lock, a duplicate of which is fitted also to the signal levers in the station signal box. One key only, of special design and of which no duplicate is made, fits both locks, and is so made that after being used in either lock it cannot be taken out again without unlocking the points or the signals, as the case may be, in the proper position to insure safety. Thus the signalman cannot part with the key for use at the siding without having the proper signals, meanwhile, at "danger" beyond his own control until the key is brought back again, without leaving the points at the siding locked in the proper position right for the main line.

The accompanying illustrations, figs. 7-14, represent different kinds of signals and methods of displaying them in use on the London & Northwestern Railway. At stations they are very often placed in a bridge which extends across the tracks. An example of this arrangement may be seen at the approach to the new Pennsylvania Railroad station in Philadelphia.

Fig. 7 is a starting signal to govern trains leaving a bay or siding and going in the direction in which they may be turned to either one of three different tracks. The arms or blades are made purposely short, to distinguish them from arms used by trains running at speed through the station. In all cases where signals are used by trains running at speed, they are made similar to figs. 12, 13 and 14, i. e., the different tracks to which trains may be turned are shown by signals in different vertical parallel lines and not by signals on one vertical post. This is to make the signals more easily understood. The signal shown by fig. 7 is fitted with one large lamp so fixed as to throw a light on all three arms.

The signal shown by fig. 8 is a home and distant on the same post. These signals are always fitted with a fork-lever slot, which prevents the distant signal arm from being lowered before the home. The home signal is the upper and the distant the lower arm. Distant signal arms are distinguished by being forked at the ends.

The signal represented by fig. 9 is a starting signal fixed to a bracket attached to the wall, and is used for the same purpose as fig. 7. Those represented by figs. 10 and 11 are also for the same purpose, but are used respectively for two

and three tracks side by side. For example, signal fig. 11 governs trains proceeding from three tracks side by side. The first signal to the left is for the first track and has only one arm, because trains proceeding from that track cannot be turned to another. The other two posts have each two arms, because each track diverges into two others. Figs. 12, 13 and 14 each represent junction signals. In all cases the arm for the main passenger track is elevated above the others.

The Adhesion and Tractive Power of Locomotives and the Resistance of Trains.

We are permitted to publish the following articles on these subjects, written by Mr. O. Chanute, Member of the American Society of Civil Engineers, for the new edition of Haswell's "Engineer's and Mechanic's Pocket-Book." They give probably fuller, more trustworthy and conveniently applied data pertaining to the subjects named than can be found anywhere else:

ADHESION OF LOCOMOTIVES.

Adhesion of a locomotive is friction of its driving-wheels upon the rails; this varies with condition of the surfaces, and must exceed traction of the engine upon them, otherwise the wheels will slip.

Improvements heretofore made in the construction of locomotives and tracks have gradually increased the proportion which the adhesion bears to the insistent weight upon the driving-wheels.

The first accurate experiments were those of Mr. Wood upon the early English coal railways. He found the adhesion to be as follows:

Upon perfectly dry rails..... 14 of weight on drivers
" damp or muddy rails..... .08 " " "
" very greasy rails..... .04 " " "

In 1838, B. H. Latrobe indicated 0.13 as a safe-working adhesion on the Baltimore & Ohio Railroad, while the modern European practice assumes about 0.2 of the weight as the maximum, and 0.11 as a minimum, except, perhaps, in some mountainous regions, subject to frequent mists. Thus, on the Semmering line, the adhesion is generally 0.16, and between Pontedecimo and Busalla, in Italy, it never exceeds 0.12 in open cuttings, nor .1 in tunnels.

Extensive experiments made upon French railways from 1862 to 1867 by Messrs. Vuillemin, Guehard and Dieudonné gave the following coefficients in actual working: In dry weather, extreme, 0.105 to 0.2, mean, 0.155; damp weather, 0.132 to 0.139; wet weather, 0.078 to 0.164; light rain, 0.09; rain, extreme, 0.109 to 0.2, mean, 0.12; rain and fog, 0.14 to 0.115; heavy rain, 0.16.

Materially better results are obtained in the United States, partly, perhaps, in consequence of the greater dryness of the weather, and certainly because of the American method of construction and equalizing the weight between the drivers, and of making the locomotive so flexible as to adapt itself to inequalities in the track.

Modern engines in America can safely be relied upon to operate up to an adhesion equal to 0.222 in summer and 0.2 in winter, of weight upon the driving wheels.

From these data the following tables have been computed:

Coefficients of Adhesion of Locomotives upon the Driving Wheels per ton of 2,000 and 2,240 lbs.

| CONDITION OF RAILS. | European practice. | American practice. |
|------------------------|--------------------|--------------------|
| | C. | Lbs. |
| Rails very dry..... | .3 | 670 |
| Rails very wet..... | .27 | 600 |
| Ordinary working..... | .2 | 450 |
| In misty weather..... | .015 | 350 |
| In frost and snow..... | .009 | 200 |

Adhesion of Locomotives, in Pounds (.222 in Summer and .2 in Winter.)

| TYPE. | No. of drivers. | WEIGHT. | | ADHESION. | |
|---------------------|-------------------|--------------|-------------|-----------|---------|
| | | Loco-motive. | On drivers. | Summer. | Winter. |
| American..... | 4 wheels coupled. | Lbs. | Lbs. | Lbs. | Lbs. |
| Ten wheeled..... | 6 " connected. | 64,000 | 42,000 | 9,350 | 8,400 |
| Mogul..... | 6 " " " | 78,000 | 58,000 | 13,000 | 11,600 |
| Consolidation..... | 8 " " " | 88,000 | 72,000 | 16,000 | 14,000 |
| Tank switching..... | 4 " " " | 100,000 | 88,000 | 19,500 | 17,600 |
| " " " " | " " " " | 68,000 | 68,000 | 15,100 | 13,600 |
| " " " " | " " " " | 48,000 | 48,000 | 10,650 | 9,600 |

TRACTION POWER.

The traction of a locomotive is the horizontal resultant on the track of the pressure of the steam, as applied in the cylinders.

Its measure is as follows: $D^2 PL + W = T$, for each cylinder.

D representing diameter of cylinder, L length of stroke, and W diameter of driving wheels, all in inches, P mean pressure in cylinder, in lbs. per sq. inch, and T tractive force on rails in lbs.

ILLUSTRATION.—Assume a locomotive with cylinders 18 in. in diameter and 22 in. stroke with wheels 68 in. in diameter, and the average steam pressure in the cylinder 50 lbs. per sq. inch.

Then $18 \times 18 \times 50 \times 22 \div 68 = 5,241$ lbs. $\times 2 = 10,482$ lbs.

TRAIN RESISTANCES.

The usual formula for train resistances, on a level and straight line, is that given by D. K. Clark:

$R = \frac{W}{V} + S$ per ton of train. R representing resistance per ton (2,240 lbs.), V velocity in miles per hour, and S constant axle friction.

ILLUSTRATION.—At 20 miles per hour, the resistance would be:

$20 \times 20 \div 171 + 8 = 10.3$ lbs. per ton of train.

This formula, however, is empirical. It gives results which are too large for freight trains at moderate or low speeds, and too small for passenger trains at high speeds. Before indicating another formula, it is best to analyze briefly the various elements of train resistances.

Engineers are not agreed as to exact measure and value of each of the elements of train resistances, but following approximations are sufficient for practical use:

Analysis of Train Resistances.—The resistance of trains to traction may be divided into four principal elements:

1st. Grades; 2d. Curves; 3d. Wheel friction; 4th. The atmosphere.

1st. Grades.—Gradients generally oppose the largest elements of resistance to trains. Their influence is entirely in-

dependent of the speed. The measure of this resistance is equal to the weight of the train multiplied by the rate of inclination or per cent. of the grade. Thus a gradient of 0.5

per 100 ft. (26.4 ft. per mile) offers a resistance of $\frac{10 \times 100}{5 \times 2000} = 10$ lbs. per ton of 2,000 lbs., or of 11.2 lbs. per ton of 2,240 lbs., which is to be multiplied by the weight in tons of the entire train.

The following table shows the resistance, due to gravity alone, for the most usual grades, in lbs. per ton of train:

| Resistance due to Grades. | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 |
|--------------------------------|-------|------|-------|-------|-------|-------|-------|-------|
| Rate per 100 ft..... | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 |
| Lbs. per ton of 2,000 lbs..... | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 |
| Rate per mile..... | 5 | 11 | 16 | 21 | 26 | 32 | 37 | 42 |
| Lbs. per ton of 2,240 lbs..... | 2.24 | 4.48 | 6.72 | 8.96 | 11.2 | 13.44 | 15.68 | 17.92 |
| Rate per 100 ft..... | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
| Lbs. per ton of 2,000 lbs..... | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 |
| Rate per mile..... | 47 | 53 | 58 | 63 | 68 | 74 | 79 | 85 |
| Lbs. per ton of 2,240 lbs..... | 20.16 | 22.4 | 24.64 | 26.88 | 29.12 | 31.36 | 33.6 | 35.84 |

2d. Curves.—The most recent European formula is that given by Baron v. Weber, $0.6504 + R - 55 = W$. R representing radius of curves in metres.

This formula assumes that the resistance due to the curve increases faster than the radius diminishes. It gives results varying from a resistance of 0.8 lb. per net ton per degree for a curve of 1,000 metres radius (3,310 ft., or $1^\circ 44'$) to a resistance of 1.67 lbs. per net ton per degree for curves of 100 metres radius (331 ft., or $17^\circ 20'$).

Messrs. Vuillemin, Guehard and Dieudonné found the curve-resistance to European rolling stock to be from 0.8 to 1 lb. per net ton per degree, on a gauge of 4 ft. 8.5 in., while Mr. B. H. Latrobe, in 1844, found that with American cars the resistance on a curve of 400 ft. radius did not exceed 0.56 lb. per net ton per degree.

The resistance of the same curve varies with the coning given the tires of the wheels, the elevation of the outer rail, and the speed of the train running over it, but both reasoning and experiment indicate that the general resistance of curves increases very nearly in direct proportion to the degree of curvature, or inversely to the radius.

Recent American experiments show that a safe allowance for curve resistance may be estimated at 0.125 of a lb. per net ton for each foot in width of gauge. Thus, for 3-ft. gauge resistance would be 0.375 lbs. per degree of curve; for standard gauge of 4 ft. 8.5 in. 0.589, say 0.60, and for 6 ft. gauge 0.75 lbs. per degree.

For standard gauge, when radius is given in feet, resistance due to this element is:

$$\frac{0.60 \times 5730}{R} = C \text{ in lbs. per ton of train.}$$

This is somewhat reduced when the curve coincides with that for which the wheels are coned (generally about 3°), and when the train runs over it at the precise speed for which the outer rail is elevated, an allowance of 0.5 lb. per ton per degree is found to give good results in practice.

Reduction of Grades on Curves.—It follows from the above estimate of curve resistance that, in order to have the same resistance on a curve as on a straight line, the gradient should be diminished by 0.08 per 100 ft. of each degree of curve. Thus a 3° curve requires an easing of the grade by 0.09 per 100 ft., a 10° curve and easing of 0.3 per 100, etc.

This, however, need only be done upon the limiting gradients, and when the sum of the grade and curve resistances exceeds the resistance which has been assumed as limiting the trains.

3d. Wheel Friction.—Experimenters are not agreed whether the friction of the wheels increases simply with the weight which they carry, but also in some ratio with the speed. Originally assumed as a constant at 8 lbs. per ton, improvements in the condition of the track (steel rails, etc.) and in the construction and lubrication of rolling stock have reduced it to 3.5 and 4 lbs. per ton for well-oiled trains. Under ordinary circumstances, in summer, it will be safe to estimate it at 5 lbs. per ton on first-class tracks, and 6 lbs. per ton on fair tracks. It may run up to 7 or 8 lbs. per ton on bad tracks (iron rails) in summer, and all these amounts should be increased from 25 to 50 per cent. in cold climates in winter, to allow for inferior lubrication.

4th. Atmospheric Resistances.—Atmospheric resistance to movement of railway trains, complicated as it is by the wind which may be prevailing, has not been accurately ascertained by experiment. It consists of: 1st. Head resistance of the first car of the train, which is presumably equal to its exposed area, in square feet, multiplied by the air pressure due to the speed.

2d. Head resistance of each subsequent car. This varies with the distance they are coupled apart, and so shield each other from the end air pressure due to the speed.

3d. The friction of the air against the sides of each car depending upon the speed. This is generally so small that it may be neglected altogether.

4th. The effect due to the prevailing wind, which modifies the above three items of resistance. A head wind retards the train, a rear wind aids it, while a side wind increases the resistance by pressing the flanges of the wheels against one rail, and, in consequence of the curves, a train may assume all of these positions to the same wind.

Recent experiments on the Erie Railway seem to indicate that in a dead calm the resistance of the first car of a freight train may be assumed at an exposed surface of 63 square feet,* multiplied by the air pressure due to the speed, and that each subsequent car may be assumed to offer a resistance of 20 per cent. of that of the first car, while in a passenger train the first car may be assumed at an area of 90 square feet,* multiplied by the air pressure due to the speed, and that each subsequent car adds an increment equal to 40 per cent. that of the first car, in consequence of the greater distance they are coupled apart.

This resistance is, of course, entirely independent of the fact of cars being loaded or empty. In practice it has been found that an allowance of 1.5 to 2 lbs. per ton of the weight of a freight train covers atmospheric resistance, except in very high winds.

In consequence of the complexity of the elements above enumerated, exact formulas cannot probably be now given for train resistances, but the following, if applied with judgment (and modified to fit the circumstances), will be found to give fairly accurate results in practice. They are for standard gauge, and in making them the curve resistance has been assumed at 0.5 lb. per degree, the wheel friction at 5 lbs., the exposed end area of the first car at 90 square feet for passenger cars and 63 ft. for freight cars, and the incre-

* This is less than the area of the car, which generally measures about 71 square feet; but part is shielded by the tender, and parts being convex, as wheels, bolts, etc., offer less resistance than a flat plane.

† Not only is the end area of passenger cars greater than that of freight cars, but in consequence of the projecting roof the end forms a hood in the nature of a concave surface, and so opposes greater resistance than a flat plane.

ment for succeeding cars at 0.4 (40 per cent.) for passenger trains and 0.2 (20 per cent.) for freight trains.

Resistance to Passenger Train.

$$W \left(G + \frac{C}{2} + 5 \right) + \left(1 + \frac{n-1}{2.5} \right) 90 P = R.$$

Resistance to Freight Train.

$$W \left(G + \frac{C}{2} + 5 \right) + \left(1 + \frac{n-1}{5} \right) 63 P = R.$$

W representing weight of train, without engine, in tons, G resistance of gradient per ton (see table), C curve in degrees, n number of cars in train, P pressure per square foot due to speed, to which an allowance must be made for wind, if existing, R resistance of train, and 5 wheel friction, both in pounds.

ILLUSTRATION.—Assume a passenger train consisting of 5 cars, weighing 136 tons, ascending a grade 0.5 per 100 (26.4 ft. per mile), with curves of 4° , at a speed of 60 miles per hour (for which the pressure is 18 lbs. per square foot), the resistance will be:

$$136 \left(10 + 2 + 5 \right) + \left(1 + \frac{4}{2.5} \right) (90 \times 18) = 6,524 \text{ lbs., of which}$$

2,312 lbs. are due to grade, curve and wheels, and 4,212 lbs. to atmospheric resistance.

2. Assume a freight train of 31 cars, weighing 620 tons, turning a curve of 3° , up a grade of 53.8 ft. per mile (1 ft. per 100), at a speed of 21 miles per hour (pressure 2 lbs. per square foot), the resistance will be:

$$620 \left(20 + 1.5 + 5 \right) + \left(1 + \frac{3}{5} \right) (63 \times 2) = 17,312 \text{ lbs.,}$$

and require a consolidation engine to haul it, allowance being made for possible winds, etc.

Assume conversely, and this is the more frequent case, it is desired to know how many tons an American engine, with a summer adhesion of 10.650 lbs., will draw up a grade of 0.9 per 100 (47 ft. per mile), with curves of 4° , assuming the atmospheric resistance at ordinary speeds at between 1.5 to 2 lbs. per ton of train, and we have:

| | Lbs. |
|---|------|
| Resistance from grade $0.9 \times 2,000 \div 100$ | = 18 |
| “ “ curve $4 \div 2$ | = 2 |
| “ “ wheel friction..... | = 5 |
| “ “ atmosphere..... | = 2 |

Total per ton..... 27

Hence, $10.650 \div 27 = 395$ tons, or about 20 cars.

In the winter the same engine will haul $\frac{9,600}{27} = 355$ tons, or about 18 cars.

The following table approximates to the best modern practice. For freight trains it gives the aggregate resistance, in pounds per ton, for various grades and curves. In using it, it is sufficient to divide the adhesion in pounds of the locomotive used by the number found in the table, in order to obtain the number of tons of train that it will haul at ordinary speeds on the gradient and curve selected. Of course, if the grade has been equated for curves, only the number found in the first column (for straight lines) is to be used in computing the tons of train on the limiting gradient.

ILLUSTRATION.—Assume a "Mogul" engine to have an adhesion of 16,000 lbs.; what weight will it haul up a grade of 74 ft. per mile, combined with a curve of 90° ?

$$16,000 \div 39.5 = 405 \text{ tons.}$$

Hence, To Compute Adhesion on a Given Grade and Curve, having Weight of Train.

RULE.—Multiply tabular number by weight of train, and product will give adhesion in pounds.

EXAMPLE.—Assume preceding elements.

$$\text{Then } 39.5 \times 405 = 16,000 \text{ lbs.}$$

NOTE.—A "Consolidation" engine, by its superior adhesion (19,550 lbs.) would haul up a like grade and curve 495 tons.

APPROXIMATE FREIGHT TRAIN RESISTANCES ON STANDARD GAUGE (4 FT. 8.5 IN.).

In Pounds Per Net Ton, at Ordinary Speeds. Curve Resistance assumed at 0.5 lbs. per °. Wheel Friction at 5 lbs., Atmospheric Resistance at 2 lbs. per Ton.

| GRADE. | Straight Per cent. | Feet pole. | CURVE. | | | | | | | | | | | | | | | |
|----------|--------------------------|---------------|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|--|
| | | | 1° | 2° | 3° | 4° | 5° | 6° | 7° | 8° | 9° | 10° | 11° | 12° | 13° | 14° | | |
| Lev. Ft. | 7 | 7.5 | 8 | 8.5 | 9 | 9.5 | 10 | 10.5 | 11 | 11.5 | 12 | 12.5 | 13 | 13.5 | 14 | 14.5 | | |
| 0.1 | 5 | 9 | 9.5 | 10 | 10.5 | 11 | 11.5 | 12 | 12.5 | 13 | 13.5 | 14 | 14.5 | 15 | 15.5 | 16 | | |
| 0.2 | 11 | 11.5 | 12 | 12.5 | 13 | 13.5 | 14 | 14.5 | 15 | 15.5 | 16 | 16.5 | 17 | 17.5 | 18 | 18.5 | | |
| 0.3 | 16 | 16.5 | 17 | 17.5 | 18 | 18.5 | 19 | 19.5 | 20 | 20.5 | 21 | 21.5 | 22 | 22.5 | 23 | 23.5 | | |
| 0.4 | 21 | 21.5 | 22 | 22.5 | 23 | 23.5 | 24 | 24.5 | 25 | 25.5 | 26 | 26.5 | 27 | 27.5 | 28 | 28.5 | | |
| 0.5 | 26 | 26.5 | 27 | 27.5 | 28 | 28.5 | 29 | 29.5 | 30 | 30.5 | 31 | 31.5 | 32 | 32.5 | 33 | 33.5 | | |
| 0.6 | 31 | 31.5 | 32 | 32.5 | 33 | 33.5 | 34 | 34.5 | 35 | 35.5 | 36 | 36.5 | 37 | 37.5 | 38 | 38.5 | | |
| 0.7 | 37 | 37.5 | 38 | 38.5 | 39 | 39.5 | 40 | 40.5 | 41 | 41.5 | 42 | 42.5 | 43 | 43.5 | 44 | 44.5 | | |
| 0.8 | 42 | 42.5 | 43 | 43.5 | 44 | 44.5 | 45 | 45.5 | 46 | 46.5 | 47 | 47.5 | 48 | 48.5 | 49 | 49.5 | | |
| 0.9 | 47 | 47.5 | 48 | 48.5 | 49 | 49.5 | 50 | 50.5 | 51 | 51.5 | 52 | 52.5 | 53 | 53.5 | 54 | 54.5 | | |
| 1.0 | 53 | 53.5 | 54 | 54.5 | 55 | 55.5 | 56 | 56.5 | 57 | 57.5 | 58 | 58.5 | 59 | 59.5 | 60 | 60.5 | | |
| 1.1 | 58 | 58.5 | 59 | 59.5 | 60 | 60.5 | 61 | 61.5 | 62 | 62.5 | 63 | 63.5 | 64 | 64.5 | 65 | 65.5 | | |
| 1.2 | 63 | 63.5 | 64 | 64.5 | 65 | 65.5 | 66 | 66.5 | 67 | 67.5 | 68 | 68.5 | 69 | 69.5 | 70 | 70.5 | | |
| 1.3 | 68 | 68.5 | 69 | 69.5 | 70 | 70.5 | 71 | 71.5 | 72 | 72.5 | 73 | 73.5 | 74 | 74.5 | 75 | 75.5 | | |
| 1.4 | 74 | 74.5 | 75 | 75.5 | 76 | 76.5 | 77 | 77.5 | 78 | 78.5 | 79 | 79.5 | 80 | 80.5 | 81 | 81.5 | | |
| 1.5 | 79 | 79.5 | 80 | 80.5 | 81 | 81.5 | 82 | 82.5 | 83 | 83.5 | 84 | 84.5 | 85 | 85.5 | 86 | 86.5 | | |
| 1.6 | 85 | 85.5 | 86 | 86.5 | 87 | 87.5 | 88 | 88.5 | 89 | 89.5 | 90 | 90.5 | 91 | 91.5 | 92 | 92.5 | | |

Transportation in Congress.

In the Senate on the 17th: The House bill appropriating \$100,000 for continuing the work on the Davis Island dam on the Ohio River was taken up and passed.

In the House on the 17th: Senate bill was passed authorizing the construction of a bridge across the Missouri River, within five miles of St. Charles, Mo.

In the Senate on the 21st: Mr. Frye, of Maine, introduced a bill to incorporate the National Railway Company, and authorizing the company to locate and build a road from Washington to New York city. The bill reserves to the government the right to precedence in the transportation of troops, munitions of war, and military supplies, without extra cost, and also provides for the transportation of the mails on through fast trains between New York and Washington, within $6\frac{1}{2}$ hours per trip. The bill also provides that the rate for passenger fare between New York and Washington shall not exceed \$5. Hugh McCulloch, John B. Gordon, William A. Wallace, Joseph A. Jamison, H. M. Hutchinson, John A. J. Creswell, George K. Chase, Noah L. Jeffries, A. E. Davis and their associates are named by the bill as the incorporators.

Portland Cement.

A late number of The Engineer contains an interesting description of the cement works of Messrs. Francis & Co. at Cliffe, which is on the banks of the Thames, near its mouth, from which the following extracts are made:

The Portland cement is manufactured from chalk and

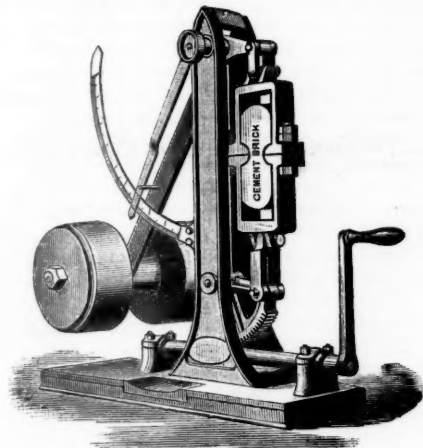
clay which in this neighborhood are found in a peculiarly soft and therefore convenient form for reduction and mixture in a wet state. These materials are used in the proportion of from two to two and a half chalk to one clay by weight; the proportions are adjusted by the regulation of the number of barrow-loads of chalk to each ten barrow-loads of clay. It is impossible to lay down any fixed rules as to the quantities to be used, as they must vary continually with the changes in density and quality of the materials.

The following table shows the usual composition of the materials and the products, and exhibits the changes which take place in the constituents after burning, grinding, and mixing with water:

| | Clay. | Slurry. | Cement. | Gauged cement, sifted through No. 100 sieve. |
|-----------------------|-------|---------|---------|--|
| Sand | 0.87 | 1.24 | 0.98 | 1.16 |
| Silica | 54.14 | 11.77 | 20.45 | 18.77 |
| Peroxide of iron | 7.76 | 2.13 | 4.37 | 3.08 |
| Alumina | 14.68 | 4.45 | 8.05 | 7.04 |
| Magnesia | | | 1.48 | 1.52 |
| Carbonate of magnesia | 4.48 | 2.87 | 1.48 | 1.52 |
| Lime | | | 62.13 | 54.89 |
| Sulphate of lime | | | 2.13 | 1.73 |
| Carbonate of lime | 2.01 | 69.97 | | |
| Water, carbonic acid | 15.03 | 5.29 | | |
| Water, organic matter | | | | 9.45 |

The following method employed at these works for testing cement will interest many of our readers:

The powder is first filled as tightly as possible into an imperial bushel measure and weighed. It is considered that this quantity should not weigh less than 112 lbs., but it often weighs more. If the weight is less than 100 lbs., it will probably be found that the cement has been imperfectly burnt. After ascertaining the weight per bushel, a small quantity is again weighed, and then sifted by means of a sieve with fifty holes to the lineal or 2,500 holes to the square inch. The residue obtained should not exceed 20 per cent. of the total weight of powder under trial. The cement should be ground to this degree of fineness, but Mr. Michéle [the superintendent of Messrs. Francis & Co.'s works] considers that it should not be sifted, as by the use of a sieve the hardest and, in his opinion, the best particles are removed. The next test, for the purpose of ascertaining if there be any



excess of lime, is conducted as follows: By the use of a trowel, the powder, with the addition of as little water as possible, is mixed up to a stiff paste, with which small pats are formed, which are immersed in water on pieces of slate as soon as the cement is set. If there are no cracks visible on their surface after immersion for 48 hours, it is generally considered that there is no dangerous excess of lime, although there can be no doubt that it is better to extend the time to three days, or as long as possible.

The next test applied is that for tensile strength. At the time the pats referred to are made, some of the stiff paste is carefully placed in brass molds, which are so constructed that after forming "briquettes" with accurate breaking sections of $1\frac{1}{2}$ in. by $1\frac{1}{2}$ in. equal to $2\frac{1}{4}$ square inches in area they can be easily removed. These briquettes should be made with great care, and only by those who have had considerable experience in their formation. Slight inattention or want of the requisite knowledge on the part of the operator will be the cause of perplexing and contradictory results. The briquettes are usually left in the molds for 24 hours, when they are removed and immersed in water until the seventh day from that on which they were made, when they are tested in one of Mr. Michéle's machines, illustrated herewith. It has been found that the best cement so tested should be capable of withstanding a tensile strain of from 300 lbs. to 350 lbs. per square inch. Though briquettes having a breaking section of $2\frac{1}{4}$ square inches are used in conformity to established usage, Mr. Michéle urges the desirability of substituting an area of one square inch. No substantial arguments can be advanced in favor of the larger section, and it has many inconveniences. To revert to the tensile strength of Portland cement, although as much as 500 lbs. and upwards per square inch at seven days has been obtained, it is found that with the existing appliances for manufacture these high strengths are sometimes obtained at the sacrifice of ultimate strength, on account of the high proportions of lime which must be used. The strongest and best cement is that which contains the greatest proportion of lime properly combined with the silica and alumina of the clay. If there is even a slight excess of lime—that is, free, uncombined lime—the cement will sometimes withstand a high tensile strength at seven days, but will be found to depreciate instead of improve in strength afterwards. Too much attention cannot be paid to the test for lime, for if there be any of this free, sooner or later it will make itself known, either by the work for which it has been used showing signs of cracking or crumbling, or by its total collapse. No doubt the first consideration is to obtain the strongest cement in order that it may form an effectual matrix for the greatest number of particles of sand or other foreign material, but it is also obvious that unless the strength is permanent or increasing it is valueless. Thus, the cement which really presents the best and most lasting qualities is not necessarily that which shows the highest

tensile strength at seven days. There are many practical difficulties in the way of extending the age of briquettes before breaking from seven to 14 or 28 days, though such a practice would enable a more accurate estimate to be formed of the material tested. Mr. Michéle seems to consider that for the present the best cement may be secured by a specification which insures an average tensile strength of 300 lbs. to 350 lbs. per square inch at seven days, coupled with a strictly enforced test for lime. Briquettes may be broken at four days as well to enable some opinion to be formed of the growing strength of the cement between that age and seven days, but the results so obtained must only be taken with due regard to the time the cement takes to set in the first instance. A quick-setting cement will show but little improvement in strength between four and seven days, whereas one which takes many hours to become firm will often show a very considerable increase of strength in the same period.

RAILROAD LAW.

Rights of Express Companies.

The following is the full synopsis of the decision of the United States Circuit Court in St. Louis in the express cases, a telegraphic note of which was published recently. By agreement a number of these cases, all involving the same issue, were tried together. The opinion given is by Mr. Justice Miller, and is as follows:

In these cases argued before me at St. Louis, with Judges McCrary and Treat, I can do no more than present certain general conclusions at which my mind has arrived in regard to the propositions argued by counsel:

1. I am of the opinion that what is known as the express business is a branch of the carrying trade that has by the necessities of commerce and the usages of those engaged in transportation become known and recognized.

That while it is not possible to give a definition in terms which will embrace all the classes of articles so usually carried, and to define it with precision by words of exclusion, the general character of the business is sufficiently known and recognized as to require the Court to take notice of it as distinct from the transportation of the large mass of freight usually carried on steamboats and railroads.

That the object of this express business is to carry small and valuable packages rapidly in such a manner as not to subject them to the danger of loss and damage which, to a greater or less degree, attends the transportation of heavy or bulky articles of commerce, as grain, flour, iron, ordinary merchandise and the like.

2. It has become law and usage, and is one of the necessities of this business, that these packages should be in the immediate charge of an agent, or messenger, of the person or company engaged in it; and to refuse permission to this agent to accompany these packages on steamboats or railroads on which they are carried, and to deny them the right to the control of them while so carried, is destructive of the business and of the rights which the public have in the use of railroads in this class of transportation.

3. I am of the opinion that when express matter is so confided to the charge of an agent or messenger the railroad company is no longer liable to all the obligations of a common carrier, but that when loss or injury occurs the liability depends upon the exercise of due care, skill and diligence on the part of the railway company.

4. That under these circumstances there does not exist on the part of the railroad company the right to open and inspect all packages so carried, especially when they have been duly closed or sealed up by their owners or by the express carrier.

5. I am of the opinion that it is the duty of every railroad company to provide such conveyances by special cars, or otherwise, attached to their freight or passenger trains, as are required for the safe and proper transportation of this express matter on their roads, and that the use of these facilities should be extended on equal terms to all who are actually and usually engaged in the express business.

If the number of persons claiming the right to engage in this business at the same time, on the same road, should become oppressive, other considerations might prevail, but until such a state of affairs is shown to be actually in existence, in good faith, it is unnecessary to consider it.

6. This express matter and the person in charge of it should be carried by the railroad company at fair and reasonable rates of compensation; and where the parties concerned cannot agree upon what that is, it is a question for the courts to decide.

7. I am of the opinion that a court of equity, in a case properly made out, has the authority to compel the railroad companies to carry this express matter, and to perform the duties in that respect which I have already indicated, and to make such orders and decrees, and to enforce them by the ordinary methods in use, necessary to that end.

8. While I doubt the right of the Court to fix in advance the precise rates which the express companies shall accept, I have no doubt of its right to compel the performance of the service by the railroad company, and, after it is rendered, to ascertain the reasonable compensation and compel its payment.

9. To permit the railroad company to fix upon a rate of compensation which is absolute, and insist upon the payment in advance, or at the end of every train, would be to enable them to defeat the just rights of the express companies, to destroy their business, and would be a practical denial of justice.

10. To avoid this difficulty, I think that the Court can assume that the rates, or other mode of compensation heretofore existing between any such companies, are *prima facie* reasonable and just, and can require the parties to conform to it as the business progresses, with the right to either party to keep and present an account of the business to the Court at stated intervals, and claim an addition to, or rebate from, the amount so paid.

And to secure the railroad companies in any sum which may be thus found due them, a bond from the express company may be required in advance.

11. When no such arrangement has heretofore been in existence, it is competent for the Court to devise some mode of compensation to be paid as the business progresses, with like power of final revision on evidence, reference to master, etc.

12. I am of opinion that neither the statutes nor constitutions of Arkansas or Missouri were intended to affect the right asserted in these cases; nor do they present any obstacle to such decrees as may enforce the rights of the express companies.

Mail Compensation on Land Grant Roads—Previous Contract.

In July, 1876, Congress passed an act directing the Postmaster-General to reduce the compensation of all railway companies for the transportation of the mails 10 per cent. per annum from the rates before fixed, and also providing that companies whose roads were constructed wholly, or in part, by a land-grant should receive only 80 per cent. of this reduced price, thus reducing the price on land-grant roads nearly 30 per cent. In July, 1875, the Postmaster-General had made contracts with most of the railway com-

panies in the Northwest for the carrying of the mails for four years from that time. The Postmaster-General assumed that this law of Congress overruled those contracts, and that he was bound to pay only the reduced prices, and he issued a circular notifying all of the companies that he should pay only the reduced price, notwithstanding the contracts. The companies protested, and the Attorney-General soon after decided that no such reduction could be made on roads not land-grant roads; but he gave no opinion in regard to land-grant roads, and the Postmaster-General continued to deduct the 30 per cent. from the companies notwithstanding their contracts.

The Chicago, Milwaukee & St. Paul and the Chicago & Northwestern companies brought suit in the Court of Claims to recover the compensation withheld; that Court decided against them, and appeals were taken to the Supreme Court. The Supreme Court recently rendered a decision in the Chicago, Milwaukee & St. Paul case, in which it was held—first, that the railroad from Portage to Tomah was not a land-grant road, and, secondly, that Congress had no power to overrule or abrogate the contracts made by the Postmaster-General for carrying the mails, and that the government could not diminish the amount contracted to be paid. This decision will give the Chicago, Milwaukee & St. Paul Road about \$30,000 and the Chicago & Northwestern Company \$83,000.

THE SCRAP HEAP.

A War Reminiscence.

We have been so busy building railroads for the last 18 years or so that many people have forgotten how actively we once used to destroy them. The following sketch from *St. Nicholas* for April will bring back the war times to many old railroad men:

"From daylight of Wednesday, Dec. 7, we marched, through rain and stiff mud, steadily toward the South, crossing the Notaway River on pontoons at 8 p. m., and halting at midnight for such rest as we could find on the cold, damp soil of a corn-field. Next day on again we went, straight toward the South, through Sussex Court House at 10 a. m., halting at dusk near the Weldon & Petersburg Railway, about five miles from the North Carolina line.

"We soon learned that this was to be a winter raid on the enemy's communications, to destroy the Weldon road, and so render it useless to them.

"Never was railway more completely destroyed! The morning after we had reached the scene of operations, in the drizzling rain and falling sleet, the whole command was set to work. As far as the eye could see down the road were men in blue, divested of weapons and accoutrements, prying and wrenching, and tearing away at iron rails and wooden ties. It was a well-built road, and hard to tear up. The rails were what are known as T rails, and each being securely fastened to its neighbor at either end by a stout bar of iron or steel which had been forced into the groove of the T, the track was virtually two long, unbroken rails for its whole length.

"No use tryin' to tear up them rails from the ties, Major," said an old railroader, with a touch of his cap. "The plagued things are all spliced together at the joints, and the only way to get them off is to pry up the whole thing, rails, ties, and all, and then split the ties off from the rails when you've got her upside down."

"So, with fence-rails for levers, the men fell to work, prying and heave-I-ho-log, until one side of the road, ties, track, and all, pulled and wrenched by thousands of strong arms, began to loosen and move, and was raised gradually higher and higher. Forced at last to a perpendicular, it was pushed over and laid upside down, with a mighty cheer.

"Once the thing was started, it was easy enough to roll miles and miles of it over without a break. And so brigade after brigade did roll it; splitting off the ties, and wrenching away the rails.

"It was not enough, however, merely to destroy the track—the rails must be made forever useless as rails. Accordingly, the ties were piled in heaps, or built up as children build corn-cob houses, and then the heaps were fired. The rails were laid across the top of the burning pile, where they soon became red-hot in the middle, and bent themselves double by the weight of their ends, which hung out beyond the reach of the fire. In some cases, however, a grim and humorous conceit led to a more artistic use of the heated rails, for many of them were taken and carried to some tree hard by, and twisted two or three times around the trunk, while not a few of the men hit on the happy device of bending the rails, some into the shape of a U, and others into the shape of an S, and setting them up by pairs against the fences along the line, in order that, in this oft-repeated iron U S, it might be seen that Uncle Sam had been looking around in those parts."

Smallest Locomotive in the World.

Henry Case, of Jamestown, has constructed a perfect locomotive that is the smallest of any in the world. He spent the best part of eight years in its construction. Following is a description of the miniature engine: "The engine measures in length, $8\frac{1}{2}$ in.; with tender, 12 in.; its height, $3\frac{1}{2}$ in.; gauge, $1\frac{1}{2}$ in.; length of boiler, $4\frac{1}{2}$ in.; diameter of boiler, $1\frac{1}{2}$ in.; fire-box, $\frac{1}{4}$ in. square, $1\frac{1}{2}$ in. deep, with heating surface all round; diameter of drivers, $1\frac{1}{2}$ in.; diameter of truck wheels, $\frac{1}{2}$ in.; stroke of piston, $\frac{1}{2}$ in.; diameter of cylinder, $\frac{1}{8}$ in.; stroke of valve, $\frac{1}{2}$ in.; eccentric, $\frac{1}{4}$ in. in diameter; length of links, $\frac{1}{2}$ in.; width of links, $\frac{1}{4}$ in.; link blocks, $\frac{1}{2}$ in. square; length of main and parallel rods, $1\frac{1}{2}$ in.; put together with straps, gibs, keys, set-screws, bolts and half boxes, with oil cups. Whistle, $\frac{1}{2}$ in. in diameter; steam gauge, $\frac{1}{4}$ in. in diameter; diameter of gong, $\frac{1}{4}$ in.; glass water gauge in cab; lamp in cab burns one hour; heater pipes and blower pipes, $\frac{1}{2}$ in. in diameter; head-light, $\frac{1}{8}$ in. square, and burns 20 minutes; safety and pop valves in dome. The pumps throw one drop of water per stroke. This engine has 555 screws to hold its parts together. It weighs $1\frac{1}{2}$ pounds; with tender, 2 pounds $2\frac{1}{2}$ ounces.—*Rochester (N. Y.) Democrat and Chronicle*.

A Member.

The new Canaan Railway is to be relaid with steel, the company having bought 40 rails. After relaying the entire line the 20 or more rails remaining unused will be stored in a safe place and kept until it is decided to extend the road to New Canaan's summer resort, the shores of the Norwalk reservoir.—*Norwalk Hour*.

Unnecessary explanation: "Conductor," said a lady passenger on the train, pointing over her shoulder to a man who was resting his feet on the window-sill behind her, "I wish you would request that brute to take his feet down." "I daren't ma'am," replied the polite but cautious ticket fiend, "he's a member of the Legislature."—*Brooklyn Eagle*.

That was in New York. In other states legislators don't do so. Another member of the New York Legislature has sent his pass back to Vanderbilt. He sent it back to have it made out for his family instead of himself alone.—*Cincinnati Saturday Night*.



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S. WRIGHT DUNNING AND M. N. FORNEY.

EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

SEEKING TO PREVENT ACCIDENTS.

In conducting any undertaking in which many persons are engaged, as in an army, a government or a railroad, one of the great difficulties which a manager encounters is that of knowing whether all his subordinates are performing their duties as they should. What each one does or should do contributes more or less to the total result, just as in a woven fabric every thread forms a part of the whole. The analogy may be carried still further, just as in the working of a loom the breaking of a thread may not be apparent when it occurs, yet will appear as a permanent defect in the texture of the manufactured material. To guard against this the mechanism of looms is ingeniously arranged so that the breaking of a thread will be indicated by the ringing of a bell or by stopping the loom. In the same way the administrative machinery of a railroad or a government should, as far as possible, be organized so that the failure of any part will be indicated in some way to those who direct the whole, and who are unable to watch every thread of the warp and the woof of the organism they control.

If the mechanism which is required to operate a railroad could be controlled with the same exactness as a loom can be, and if every failure of the operatives could be indicated by a warning bell, it would save railroad managers many anxious hours. Unfortunately human ingenuity has not yet been able to devise any means which will indicate all the broken threads, in the form of neglected duties, which occur in the management of human affairs. Under these circumstances the next best thing to do will be to discover if we can the weak and imperfect strands, and thus lessen the number of breakages if they cannot be entirely prevented. An attempt to do this has recently been made on one of the English railroads, which seems to be well worthy of a trial, and the method of which appears to be applicable to many or all of the different departments of railroad operation. The plan referred to is described as follows in a recent number of the *London Engineer*:

"A step has been taken by the Superintendent of the London, Chatham & Dover Railway, which will no doubt tend to the prevention of accidents, bring out a great many practically valuable suggestions for the working of the trains, and will at the same time give the guards great encouragement in the most effective discharge of their duties. He has issued forms on which twelve important questions are to be answered monthly by the guards in the employment of the company. They are as follows: 1. What is the average number of hours on duty each day? How many Sundays during the month have you been off duty? 2. Have you a book of the company's rules and regulations, and a service time-book for the month, in your possession? 3. Are you regularly supplied with all special notices issued from time to time? 4. Give the number of your watch, and say if it keeps good time. 5. Have your trains proper time allowed for the journey throughout? If not, give particulars of the times you consider would be an improvement. 6. Can you suggest any alteration in the formation of the

trains whereby any vehicle can be dispensed with, or the working of the trains improved? 7. Have you observed any irregularity or defect in the working of the signals at any station, junction, etc.? 8. Have your brakes always been efficient? 9. Are you aware of any irregular or dangerous practice in the working of the line? The 10th, 11th and 12th questions refer to whether the plate-layers exhibit proper signals; whether the guards notice the trains run unsteadily; and whether they have anything to report or suggest relative to the working of their trains."

The plan of preparing and issuing questions of this kind and requiring replies to be made to them periodically has a great deal to recommend it. It will be obvious of course that the questions which should be asked on an American railroad would not be exactly the same as those which the Superintendent of the London, Chatham & Dover Railway has asked the "guards" on that line to answer. The conductors here and there are so unlike that the inquiries would naturally assume quite a different form. This fact, however, does not detract from but rather adds to the advantages of the system. To make some of these apparent, it may be said that the catechetical method of giving and receiving information has very great advantages, which, perhaps, no one will appreciate fully until he writes a book in the form of a catechism or a circular of the kind given above. Any one who does this will find that the questions are by far the most difficult part to write. To do this the author must have the subject to be discussed so distinctly in his mind as to know what questions the learner ought to ask. This implies a very thorough and complete knowledge of what he intends to write about, and it may safely be said that no writer ever undertakes to discuss fully and clearly any subject without finding that his knowledge of it is far from being very definite, exact and complete.

The advantage then of circulars, similar to the one copied above, would begin by compelling the officer who prepares them to form a clear idea of what questions should be asked. In doing this the attitude of mind which he would be compelled to assume would be as though he said to himself: What is there on our road which is likely to be wrong, or neglected, or which needs improvement? It can readily be imagined that the Superintendent of the London, Chatham & Dover road in preparing his circular said to himself: "Are any of our men overworked? Perhaps some of them are not supplied with books of the company's rules or the special notices issued from time to time. Do their watches keep good time? It is easier to specify in the office what time trains shall make than it sometimes is for those who run them to conform thereto. Suppose we ask the men whether they have any difficulty, and when, in running according to the time tables? No one knows better than the 'guards' or conductors the requirements of the traffic and when and where more vehicles are needed, or some may be dispensed with; therefore we will get their testimony regarding these points. Our company has been at great expense to equip its line with effective signals, which are under the control of a superintendent who thoroughly understands their construction. Is it not possible, though, that those persons who must be governed by the signals would be the first to observe any defects in their construction, or in the working of them? Therefore we will invite them to give their evidence on this point. With the existing controversy over the brake question it is important that we should keep a constant record, not only of the defects of the mechanism used, but we should have positive testimony of the absence of defects; consequently, we will have our men record their observations monthly. If there are any irregular or dangerous practices in the working of the road, the trainmen should be the first to observe them, and in the nature of things, if they are observant, they would be able at times to make valuable suggestions to the managers. We will therefore not shut our eyes nor close our ears to what they have to say, but open an avenue through which such suggestions or complaints may always reach us."

It is easy to understand that when a superintendent assumes the attitude of mind indicated by our imaginary monologue, the evils indicated—if they exist—are already in a fair way of being remedied, because not only has he in his own mind contemplated their existence, but he has arranged the machinery of his organization so that—to return to the metaphor of the loom—if a thread breaks it will ring a warning bell, to which the proper officers will be prepared to give heed. The educational advantage of the system therefore begins, but does not end, with the officers who prepare the circulars.

On the other hand, it will undoubtedly be found that the asking of a series of carefully prepared questions will have the effect of inducing those who must answer them to inquire more carefully into the matters to which they refer than they otherwise would have done. Such questions thus become a stimulus to self-

education to all to whom they are submitted, and will lead them to inform themselves about matters with reference to which they may have been in the habit of feeling an easy indifference.

It is true that on nearly all roads men in various positions are required to report when things are wrong or defective, which is very well, as far as it goes; but as every one with experience in the management of men or affairs knows, a great difficulty which must always be contended with is the apathy of men. They—and we too, for that matter—at times seem voluntarily to prefer being blind and deaf to keeping our eyes and ears open. I did not see, did not hear and did not think, are responsible for many sins and evils. Anything, then, which will arouse men to greater vigilance will have a good effect. To require them to report only when things go wrong, encourages the habit of waiting for misfortune instead of anticipating. If a locomotive runner is obliged to report whether his brakes are in good condition or not, and he knows that he will be held accountable for the correctness of his report, he will be likely to examine them carefully; whereas, if he only reports after they become out of order, he will be apt to rest in an easy contentment so long as they work all right.

Of course the replies which would be received in this way would contain an immense amount of chaff to a very little grain. Probably a good many complaints, suggestions and reports of an ignorant, foolish or frivolous character would be made, but they would at any rate have the good effect of indicating the relative intelligence and clearheadedness of the men employed.

Any one who has been at all observant of the working of railroads has seen, too, that their interests often suffer from the insufficiency and faults of subordinate officers. They will be stupid, tyrannical, will be governed by their own selfish interests or those of their "friends," will show the most unjust favoritism to their partisans, and be guilty of the greatest injustice to worthy men who do not happen to occupy the right relations to those who hold some "brief authority." A system of inquiries and reports made to headquarters would give a hearing to those who are not treated fairly, and would often show the cause of a good deal of friction and heat, the origin of which would otherwise not be apparent.

It has been said that the system could be applied to other departments besides that to which the London, Chatham & Dover circular was addressed. If this were done, of course some or all the questions would be different for each department. It would be impossible, without the most thorough practical knowledge and careful study of the circumstances existing in each case, to frame a series of questions which would be adequate for the purpose for which they are intended, and no attempt will be made here even to indicate what they should be. In fact, in writing a catechism, or a treatise in the form of question and answer, on any subject, two-thirds of the work is done when the questions are asked. Now a series of questions adapted to the different departments of railroad operation would, as a matter of fact, form the basis of a treatise on that subject. Therefore the work of framing them is quite too serious a matter to be undertaken in an article of this kind; but if the method of issuing such circulars was adopted on different roads, and the officers of each of them should exert themselves to frame the most useful and discriminating questions, the result would be that a collection of these could soon be made, from which any railroad manager could collate a number which would be more comprehensive and complete than those framed by any one person would be likely to be. In this way a more or less perfect catechetical system of inquiry would be developed, which would be certain to be very serviceable in accomplishing the object aimed at in adopting such a system.

It could be applied, of course, to the locomotive, car, track, and in fact to all departments, the first requisite, though, being that the person who frames the questions should have a thorough knowledge of the matters to be investigated by his inquiries and the answers which will be given to them.

The main advantage, though, and the one to which all the others are incidental, is that it would indicate defects of various kinds, of which, without such information, the officers would be ignorant. The system might be so organized that it would result in a constant flow of information from all departments of a railroad into the office of the superintendent or manager and would no doubt thus indicate defective methods of working, the existence of which would otherwise not be suspected. The tendency of railroad management, as the lines and business increase, is to separate the operatives too far from the principal managers, so that the complaints and suggestions of the former never reach the latter. Subordinate officers, who

come between the chief executives and the men, are apt to cultivate what they choose to think is a wholesome apprehension of their authority, the effect of which is to close the mouths and shut the eyes of those who, if they dared, could give information which it would be very much to the interest of railroad companies and their officers to know. Whenever any man or set of men assume that they "know it all" and are not in need of information from other sources, they have reached a stage of decadence and inefficiency.

Very busy men, too, are prone to fall into the error of underestimating the value of knowledge which must be gleaned from a great mass of rubbish. Every moment of their time can be so usefully and productively employed that it seems a waste of it to engage in the elimination of a small amount of very precious truth from a great deal of error or commonplace iteration. Therefore they shut their doors and their ears to those below them, and thus exclude the chaff, but at the same time deprive themselves of those grains of truth whose value is incalculable.

The plan has the merit, too, of not being attended with any risks. At the worst, if it is tried, it may be found ineffective and useless; but, as was said in the beginning of this article, it seems to promise enough advantages to merit a trial.

CROP PROSPECTS.

Crop prospects are already canvassed by speculators, with the usual amount of ignorance, though we believe there has been no such striking display of ignorance as that which last year week after week cited the winter killing of fall-sown wheat in support of a bear movement in Northwestern and Milwaukee & St. Paul stocks, though almost the only wheat grown on the lines of these companies is spring wheat.

Thus early in the season it is, of course, impossible to forecast next summer's crops, all but one of which are yet to be planted. All we can do is to compare the prospect at this time with what it was last year and in previous years. The "prospect" at this time is judged by the acreage and condition of winter wheat, the intentions of the farmers as to the area they will sow and plant this spring, and the weather as favoring or otherwise planting operations.

As to area of winter wheat sown, we have as yet statistics only from the state of Illinois, showing a decrease compared with last year of 275,296 acres, or 9½ per cent. (from 2,951,668 to 2,676,372 acres). The acreage last year and 1880, however, was enormously greater than ever before, and 814,000 acres more than in 1879, when it was larger than ever before. The exceptionally large and profitable wheat crops for four successive years had caused the farmers of Central and Southern Illinois to substitute wheat for corn to a considerable extent, and the failure of wheat last year doubtless had the effect of causing the farmers to sow less and leave more ground to be planted with corn this spring. In 1877 for every 100 acres of winter wheat there were 514 acres of corn in Illinois, in 1880 only 255 acres (according to the reports of the State Department of Agriculture). For 1881 we have not the figures, but a very considerable portion of the area sown to winter wheat was ploughed up and planted to corn when it was found in the spring to be badly winter-killed.

The condition of the winter wheat this spring is reported to be fully up to the average in Central Illinois, where about half the acreage is; in Southern Illinois, where most of the rest of it is, it is unusually promising. For the state as a whole the condition is better than in either of the three previous years, in two of which the yield was as good as ever was known.

By this time the crop is beyond the danger of winter killing; but it has yet to encounter the dangers incident to growth, insects, rust and bad harvest weather. Last year at this time the winter-killing had destroyed the possibility of a very large crop. This year nothing has yet happened to prevent the yield being as large as in any year, and the early spring is favorable to a vigorous growth.

Late reports of the condition of winter wheat in Michigan say that it was never better, and such scattering reports as have been made from other parts of the country are favorable. It is not probable that the acreage of the whole country is as large as last year, the fall weather having been unfavorable for plowing and sowing; but every acre not sown will be available for some spring crop, and will certainly grow one of some kind, unless the weather should be extraordinarily unfavorable between now and June.

As for the farmers' intentions, we may be sure that they will put crops on all their plow land if the weather will let them. What is uncertain is the amount of new ground that will be brought under cultivation.

There will doubtless be a great deal in the newly settled districts, but this will be an extremely small fraction of the whole. The greatest room for expansion in this direction is on the farms of the older parts of the prairie states, on most of which west of the Mississippi a very large proportion of the land is still raw prairie, utilized only for grazing, but brought under cultivation gradually, according to the farmer's opportunities and needs. This land must be broken the year before crops are sown on it, and most of the breaking is done between corn-planting and harvest, as in this way the wild grass is most completely killed, and there is little time for this work at any other season. Last year was very unfavorable for such work, the spring being very late, and labor being unusually scarce and high. Probably more than the usual amount of breaking was done in these states by new settlers, however, of whom there was an unusual influx in Western Iowa and other districts.

The area planted depends considerably on the length of time in which it is possible to plow and sow. In this respect last year was probably the worst that we have ever had. In many parts of the West it was May before it was possible to plow, and the wheat and oats had to be sown and corn planted within six weeks. This year there was considerable plowing in Northern Illinois as early as the first of March, and a little spring wheat was sown by that time. Rains have interrupted plowing but the weather must be miraculously bad if we do not have nearly twice as many days for plowing and seeding as we had last year, and we may confidently expect that every acre of plow land will have a crop of some kind on it. Should wet weather prevent sowing all the wheat intended, the land will grow oats and corn.

What the fate of these spring crops will be it is idle to speculate. The very earliness of the season lessens some of the dangers, but early-planted crops may turn out badly, and we are not yet sure that the corn can be planted early. The ground can be prepared early, which was not possible last year, but a frosty May would prevent planting till late. But late-planted corn may be as good as any if there are no early frosts.

In the South we hear of nothing but the floods. It should be remembered, however, that the Mississippi overflow reaches but a small part of the whole South. The land overflowed is probably the most fertile in the South, and includes many of the finest plantations and in the aggregate a very large area of cultivated land; but nevertheless most of the overflowed land—probably five-sixths of it—never was plowed. How much of the cultivated land now under water will bear a crop this year depends largely on the time when the flood shall subside. Should it last no longer than usual, those farmers who can provide themselves with tools and teams will be able to put in considerable cotton, and plant corn on all the rest of their land that can be plowed. Too much stress has been placed on the probable limitation of cotton planting by reason of the flood, and it is forgotten that the South plants more acres with corn than with cotton. If it becomes evident that cotton cannot be planted on the Mississippi bottom lands this spring, the planters in other parts of the South will be incited to plant as much cotton as possible, and less corn than they otherwise would have done. And the bottom lands are better for corn than any other part of the South. There may in this way be no considerable decrease in the acreage of either crop in the South. Of course, the destruction of stock, buildings, fences, etc., will remain a total loss to the planters, and it is not probable that, under the most favorable circumstances, they can command the means to plant all their land this spring. The effect on the crops as a whole, however, can hardly be formidable; and the effect on railroad traffic will not be in proportion to that on the crops, for, naturally, the lands which the Mississippi overflows are mostly those within easy reach of the river steamboats, and their crops are marketed and their supplies brought mostly by these boats. The traffic in supplies must be largely increased by the flood, but mostly to the advantage of the steamboats.

Last year opened quite favorably for the cotton crop, though it was a few weeks later than usual. A little has been planted already this year, but it has nearly all its many dangers yet to meet. Cultivation west of the Mississippi was limited last year by the extraordinary diversion of labor to new railroad construction. At present it does not appear that anything like so much new railroad will be built in that section this year. On the other hand, the planters last year had just marketed a great crop at high prices; this year, west of the Mississippi especially, the crop was very light, and the planters are now poor and generally not so able to extend their operations as they were last year.

Bankrupt Railroads and Cutting Rates.

Mr. Vanderbilt was interviewed by a New York Tribune reporter last week for the purpose of getting his opinion of the value of the stocks of his railroads—the whole being apparently part of the programme in starting the present successful bull movement. In the course of it Mr. Vanderbilt expressed very unflattering opinions of those who are circulating false statements, and so "bearing" the prices of other people's stocks. Yet before the interview was finished Mr. Vanderbilt spoke of the New York, Lake Erie & Western and the Grand Trunk as "bankrupt" roads, though they are no more bankrupt than the New York Central itself. Doubtless the expression was used without the slightest thought of "bearing" the market for Erie and Grand Trunk stocks; but such an expression from so prominent a railroad man might well have that effect, especially in London, where the circumstances are not so well known, and where these stocks are very largely held. At least they show that disparaging other people's property is not confined to professional bears, and that unfavorable opinions of a property may be held by those who do not mean to "sell short" on these opinions.

When Mr. Vanderbilt spoke of the Grand Trunk and the Erie as "bankrupt" roads, it was in support of the position that they were more likely than the New York Central to reduce rates recklessly, not having any dividends to pay. But the New York Central is no more compelled to pay dividends than either of the other roads, and the Grand Trunk has for some years paid dividends on one class of its stock, and has two or three times paid something on its second preferred stock. Its stockholders get whatever profits the road makes, and, judging from what they say at the half-yearly meetings in London, they are as eager as any other stockholders to have their dividends increased. The Erie has recently paid one dividend on its preferred stock, and probably the holders of its common stock are much more anxious to obtain a dividend than the holders of New York Central are to maintain theirs, for the simple reason that a dividend in Erie common would be looked upon as a beginning of probably regular returns, and would result in a great advance in the market price of the stock. Further, aside from dividends, the New York, Lake Erie & Western is much more interested in having rates profitable than the New York Central can be, for the reason that it has a much greater interest charge to pay, and it must pay this or die. The New York Central needs but \$4,750,000 of profits a year (for interest and rentals) to save it from bankruptcy, while the Erie last year had to pay \$6,418,000. The road with the smallest margin of profits over fixed charges is naturally the one which most fears a great reduction of profits. In the year ending with September, 1880, the New York Central's surplus after paying 8 per cent. dividends was nearly twice as great as the Erie's surplus over fixed charges. Traffic and expenses remaining the same, such a reduction of rates as would have left the Erie unable to pay all its fixed charges would have given the New York Central more than enough to pay 8 per cent. on its stock. If it happened the next year when through rates were reduced that the Erie suffered less than the Central, it was because the Erie had a very large increase in the traffic on which rates were not reduced; it still suffered greatly by the low rates, but for which its shares would probably be worth \$30,000,000 more in the market than they are to-day.

The Erie, indeed, needs a very large income. If its funded debt were no larger than the New York Central's, it would have had a very handsome amount for dividends on its common stock. But a big debt does not encourage recklessness; it compels caution, because the consequences of great losses are much more serious than if the capital were mainly shares instead of bonds.

Recklessness in cutting rates may likely enough be shown by a company with a very narrow margin of profits; but then the traffic affected is usually one of which this company gets but a small share, or if a large share, gets it only by less than regular rates. This was long the condition of the Grand Trunk, and is still, to some extent; also of the New York, Pennsylvania & Ohio with regard to some important passenger traffic, of the Vermont Central and the Chesapeake & Ohio with regard to shipments from New York to the West, and doubtless of many other lines. The Chicago, Rock Island & Pacific's new line between Chicago and St. Paul is doubtless an instance, though we do not know how far this route bids below the direct lines for the traffic. There is hardly any road in the country further from bankruptcy than the Rock Island; and it probably keeps up rates to Omaha and Missouri River points, to which it has short lines, as strictly as any of its competitors. But until recently it had no Minnesota traffic at all. Its conservatism with regard to Omaha business did not prevent its accepting trifling profits on any Minnesota traffic it could get. Insisting on an average profit of a dollar on work which costs it a dollar when it can get it, it could better afford to take Minnesota traffic at a profit of ten cents than to go without it altogether, always provided that the rates on its other traffic are not affected by its Minnesota rates, as they need not be unless some rival with a large interest in Minnesota traffic does for the Rock Island what the Rock Island has done for it—namely, reduces rates on the traffic of which the Rock Island has a large share and on which it makes full profits.

Very disagreeable competition is often felt from companies reducing rates in this "reckless" way, the reduction being made, however, not because the company making it does not mind reducing its profits, but because in this way, and only in this way, it is likely to increase them. The road following such a policy may chance to be bankrupt, and in

such a case it is very likely that its low rates will be charged to its bankruptcy.

By the way, if non-dividend paying roads are to be classed with bankrupt roads, or with those which are reckless in making unprofitable rates, Mr. Vanderbilt has two which at present must be assigned to this class. The Michigan Central and the Canada Southern, however, we believe usually aim to make the largest possible profits, and are no more reckless than their competitors in cutting rates.

February Accidents.

Our record of train accidents in February, given in full on another page, shows for that month a total of 88 accidents, whereby 23 persons were killed and 69 injured. Fifteen accidents caused the death of one or more persons each, and 25 caused injury but not death, leaving 48, or 54.5 per cent. of the whole number, in which no person was hurt badly enough for record.

Six of the killed and 17 of the injured were passengers; 17 killed and 52 hurt were railroad employes, so that 69 of the whole number of casualties—75 per cent.—were employes. This, it must be remembered, includes accidents to trains only, and brakemen, injured in coupling cars and similar ways, are not included.

As compared with February, 1881, there was a decrease of 61 accidents, of 4 in the number killed and 184 injured. Apparently the contrast is a favorable one.

These accidents may be classed as to their nature and causes as follows:

| | |
|---------------------------------|-----------|
| COLLISIONS: | |
| Rear collisions..... | 19 |
| Butting collisions..... | 12 |
| Crossing collisions..... | 1 |
| DERAILMENTS: | |
| Broken rail..... | 1 |
| Broken or defective frog..... | 1 |
| Broken bridge..... | 4 |
| Spreading of rails..... | 4 |
| Broken wheel..... | 4 |
| Broken axle..... | 4 |
| Broken truck..... | 1 |
| Snow..... | 2 |
| Land-slide..... | 2 |
| Wash-out..... | 2 |
| Man on track..... | 1 |
| Accidental obstruction..... | 2 |
| Misplaced switch..... | 4 |
| Purposely misplaced switch..... | 1 |
| Malicious obstruction..... | 1 |
| Unexplained..... | 20 |
| Total..... | 88 |
| Boiler explosions..... | 2 |
| Broken connecting rod..... | 1 |
| Rock falling on train..... | 1 |

Of the collisions four were caused by trains breaking in two; two by mistakes in sending or receiving orders; one each by want of signals or failure to use them, by cars left carelessly on the main track, and by a wreck on the other or opposite track.

Of the broken bridges one had its supports partly washed out by high water; one was a wooden trestle; of another we have no information except that it was of wood, while the fourth was an iron bridge which had been specially noticed and approved at the time of its erection 10 years ago.

The general classification of these accidents is as follows:

| | Collisions. | Derailments. | Other. | Total. |
|------------------------------|-------------|--------------|----------|-----------|
| Defects of road..... | 7 | 3 | 14 | 24 |
| Defects of equipment..... | 4 | 3 | 32 | 39 |
| Negligence in operating..... | 28 | 4 | 1 | 33 |
| Unforeseen obstructions..... | 9 | 1 | 10 | 20 |
| Maliciously caused..... | 2 | 1 | 2 | 5 |
| Unexplained..... | 20 | 1 | 20 | 41 |
| Total..... | 32 | 52 | 4 | 88 |

Experience indicates that a considerable part of the unexplained derailments may be charged to defects of road, and a few of them to defects of equipment. It is not easy always to decide, for it often happens that a broken wheel or axle may be found after an accident under such circumstances as to make it very difficult to decide whether the break caused the accident or was caused by it.

One of the malicious derailments was caused by misplacing a switch, the other by an obstruction placed on the rails.

A division according to classes of trains and accidents is as follows:

| | Collisions. | Derailments. | Other. | Total. |
|-------------------------------|-------------|--------------|-----------|-----------|
| Accidents: | | | | |
| To passenger trains..... | 2 | 13 | 2 | 17 |
| To a pass. and a freight..... | 8 | 1 | 1 | 10 |
| To freight trains..... | 22 | 39 | 1 | 62 |
| Total..... | 32 | 52 | 4 | 88 |
| Casualties: | | | | |
| Killed by..... | 8 | 15 | 1 | 24 |
| Injured by..... | 25 | 34 | 10 | 69 |
| Total..... | 33 | 49 | 10 | 92 |

Collisions were most fatal to trainmen, all the killed and 24 of the injured in that class of accidents being employes. Six of the killed and 16 of the injured by derailments were passengers, and the 10 persons injured in other accidents were all trainmen.

The sharp contrast shown by the month to the corresponding month last year is not at all surprising when we compare the almost continual snow-storms and intense cold of a year ago with the mild weather and general freedom from storms enjoyed this year. It is true there was a good deal of rain, but the month could not be called a stormy one. The excessive rainfall did not come until near the end of the month, and its effect will be more apparent in the March accidents.

The month has, comparatively, a very favorable record. It was free from any very bad mishaps, and in it the accidents of management were reduced in proportion. For the first time in many months the collisions were but little over one-third of the whole number of accidents, while the number of misplaced switches is much smaller than usual.

There was one notable instance of a danger peculiar to double-track roads, and from which no protection can be given by any kind of signals, and that is the throwing of a wrecked car, or of debris from a wreck on one track, upon

the opposite track directly in front of an approaching train. In this case it was fortunately a freight train which was so wrecked, but the damage to property was very large. Probably the only protection against such an accident would be to separate the two tracks by a considerable space; but in the nature of things that is impracticable.

For the year ending with February the record is as follows:

| | Accidents. | Killed. | Injured. |
|----------------------------------|--------------|------------|--------------|
| March..... | 113 | 38 | 177 |
| April..... | 63 | 22 | 66 |
| May..... | 85 | 24 | 76 |
| June..... | 73 | 31 | 78 |
| July..... | 102 | 38 | 122 |
| August..... | 129 | 31 | 67 |
| September..... | 144 | 56 | 227 |
| October..... | 131 | 31 | 133 |
| November..... | 133 | 50 | 120 |
| December..... | 113 | 36 | 96 |
| January..... | 137 | 41 | 198 |
| February..... | 88 | 23 | 69 |
| Total..... | 1,311 | 421 | 1,429 |
| Total, same months, 1880-81..... | 1,324 | 345 | 1,508 |
| 1879-80..... | 835 | 178 | 643 |

The averages per day for the month were 3.14 accidents, 0.82 killed and 2.46 injured; for the year they were 3.59 accidents, 1.15 killed and 3.92 injured.

The average casualties per accident were, for the month, 0.261 killed and 0.784 injured; for the year, 0.321 killed and 1.090 injured.

The averages per month for the year were 109 accidents, 35 killed and 119 injured, against similar averages of 110 accidents, 29 killed and 126 injured in 1880-81, and 70 accidents, 15 killed and 54 injured in 1879-80.

The year begins to make a little better showing than last year, but has still a much worse record than the preceding one.

Foreign Railroad Notes.

In support of the proposition to reduce the already very low fourth-class passenger rates in Germany, a railroad man cites the experience of a line on which, previous to March, 1879, the rate between a large city and a station $4\frac{1}{4}$ miles distant had been $2\frac{1}{2}$ cents for the fourth and 5 cents for the third class. At the end of that time there was a revision of the passenger tariff, and the rates became 5 and $7\frac{1}{2}$ cents respectively for this trip of $4\frac{1}{4}$ miles. The numbers of tickets of these two classes sold in the year previous to the advance and in each of the two years following it were as follows:

| | —No. tickets sold in year to March 1.— | | |
|-------------------|--|-------|-------|
| | 1879. | 1880. | 1881. |
| Third class..... | 2,930 | 1,802 | 1,962 |
| Fourth class..... | 6,977 | 1,475 | 1,385 |
| Both..... | 9,907 | 3,277 | 3,347 |

The sales of third-class tickets have thus fallen off more than one-third since the advance from 5 to $7\frac{1}{2}$ cents, and the sales of fourth-class tickets at 5 cents are but about one-fifth what they were at $2\frac{1}{2}$ cents. The person who supplies this information explains that this is because of the very low wages of those who travel fourth class. He says that the laborer's wages in the country commonly are but $2\frac{1}{4}$ cents an hour, so that a 5-cent ticket costs him two-hours' labor, and, including the time of the trip, he can usually walk the distance in less time than is required to earn the money to pay his fare; and with women, whose wages are 20 cents and less per day, it is still harder to earn their fare. He thinks that the present Prussian fourth-class fares (about 0.8 cent per mile) will not result in a free use of the cars for short distances except where the wages are as high as 60 cents a day. At that rate he says the time required for going to and from the train and for the ride (which he reckons at two hours for the shortest ride) and that required to earn money to pay for the ticket would just about equal the time required for walking, and then the ride would be preferred.

There is probably no place in this country where the reduction of a rate below 5 cents would be followed by any very great increase of travel, unless perhaps on street railroads less than a mile long; but the reduction of a 25 cent fare by one half might in many places result in quadrupling the traffic. Where there are four classes, fares can be quite closely adjusted to the ability of people to pay, which is not possible where there is but one.

Recently on the Rudolph Railroad in Austria experiments were made with an electric head-light for locomotives. The motive power for the electrical machine is obtained from a small engine which is mounted on the boiler and receives steam from it. The electric lamp is placed near the smoke-box door and can be turned on a pivot by the engine man from the foot-board in order to direct the light in any desired direction. Some early experiments with a locomotive electric light failed, but later ones with a lamp constructed by the engineer Sedlacek are said to have succeeded completely. The light is said to have been uniform and illuminated the track perfectly for 1,300 ft. to 1,600 ft. in advance on straight lines, and, by turning the lamp, for more than 600 ft. on curves. There was a long tunnel on the line where the experiments were made, and an opportunity was offered to see its value in examining such a work. The distinctness with which signals, and especially the colors, could be seen for great distances was striking, and it made it possible to observe the position of every switch on entering a station.

The cost of the apparatus is not stated, but some remarks are made in the report of its performance which indicate that the cost will be a great obstacle to its introduction.

At a recent meeting of the German Society of Mechanical Engineers, Mr. Hennig, General Master of Machinery of the Berlin & Anhalt Railroad, made the following statement of

the number of years of service of each locomotive on his road that had been abandoned as no longer fit for service:

| No. of engines. | Years of service. | No. of engines. | Years of service. |
|-----------------|-------------------|-----------------|-------------------|
| 1 | 9 | 3 | 22 |
| 1 | 10 | 1 | 24 |
| 2 | 11 | 2 | 25 |
| 4 | 12 | 3 | 26 |
| 4 | 15 | 3 | 27 |
| 2 | 16 | 1 | 28 |
| 1 | 19 | 1 | 29 |
| 6 | 20 | 2 | 30 |
| 1 | 21 | 1 | 34 |

Of 39 locomotives, 15 were in use less than 20 years, and their aggregate service was 791 years, or an average of 20 years, $2\frac{1}{2}$ months each. The ten engines with longest life gave 284 years service; the ten with shortest life, only 65 years service. The short-lived engines were generally the older ones, and it is quite probable that many of them were thrown out of service because they were less economical than modern ones, and not because they were worn out.

Engine Inspector Stöcker, of the Berlin & Anhalt road, says that the German railroads have found that surface water from shallow wells is much better for the boilers than water from deep wells. Of numerous plans for preventing incrustation one of the oldest and best, he says, is the Haën process, in which, by the addition of chloride of barium and a paste of lime or quicksilver, the substance which forms incrustation are precipitated before the water is introduced into the boiler. Satisfactory results have been obtained from experiments with this process. At water stations in Bitterfeld and Lepsic the feed water is doctored with a dark brown fluid called "lapidolyt," which consists of a solution of tannic acid made neutral with alkalis. So far, it is said, the experiments have yielded very satisfactory results.

Lighting Cars by Electricity.

A thorough discussion of the use of electricity for lighting trains appears in the *Journal* of the German Railroad Union on the occasion of the Frankfurt experiments. The general conclusion is that electric lighting of trains will become practicable when there has been some improvement in the storage of electricity. At the Frankfurt experiment a six horse-power dynamo-electric machine in a baggage car was driven from a car-axle. Around the machine and against the sides of the car were placed 24 Faure accumulators, which stored the surplus electricity while the cars were running faster than necessary to develop the amount consumed for the lights, but the surplus was not sufficient to light the three cars during the stops. While running the cars were brilliantly lighted with the electricity coming directly from the machine. It is said, however, that the storage of electricity would have been better but for the use of lead not chemically pure in the accumulators.

The general conclusions of the writer in the *Journal* of the German Railroad Union are as follows:

I. That the lighting of a railroad train, in the present condition of electric science, is not possible by the Faure secondary battery alone; it is indispensably necessary to carry a dynamo-electric machine on the train for such lighting.

The dynamo-electric machine can be best and most cheaply driven by the car axle, and the power of the train by day can be used for generating electricity to be stored for use at night, and its power by night can be used directly. If the batteries become fully charged by day, they can be taken out and held in reserve at stations, and fresh batteries put in the car.

Whether it is advantageous to put the dynamo-electric machine in the baggage car, as at Frankfurt, seems doubtful, as a man is then required to attend this machine, which makes electric lighting too costly.

It is thought that it would be better to have it attached to the rear of the locomotive or tender, where it could readily be driven by a belt from the rear axle of the engine or tender, and the machine in that situation could easily be attended by the engine man and fireman, both of whom have the necessary mechanical knowledge.

When steam heating of cars was first introduced in Germany it was likewise thought necessary to have a special boiler in the baggage car, but now the steam is generally taken directly from the boiler, and the heating is regulated by the engine man. This will probably be the course of electric train-lighting if the dynamo-electric machine is placed in the baggage car. If it is put there, easy communication between the baggage car and the tender should be established, which, this writer thinks, would not be easy on German trains.

II. To light a train with electricity it is necessary to provide every car with Faure secondary batteries, in order that a car separated from the train for one or two hours may be well lighted with them. This can be done by the Faure batteries, since ten or twelve elements completely charged are capable of supplying the six lamps and the requisite intensity.

With regard to cost, the price of a Möhring dynamo, electric machine sufficient for the largest train is about \$425. One Faure element costs, if cheaply constructed, about \$10. Since there are five or six lamps in a car, 10 or 12 accumulators are necessary, as it requires about two elements to supply one Swan lamp. The lamps are very cheap, costing 25 to 50 cents each. According to this, the equipment of a passenger car for electric lighting will cost about \$175, while its equipment for gas-lighting costs at least \$225. Bearing in mind the numerous gas works, costing \$10,000 to \$15,000 each, the gas-pipes and the apparatus for supplying the cars, it is clear that the apparatus for dynamo-electric lighting is by far the cheapest.

The impression left by the results of the experiments and investigations is that the solution of the problem of lighting

cars by electricity is evidently only a question of time. The Frankfort Royal Railroad Directory is now preparing a new train of six cars of improved construction to continue its experiments.

It is thought by some that the final solution will be by the use of Faure accumulators charged by a stationary engine and placed under each car in an iron case, as needed, as compressed gas is now used. This would avoid making a draft on the power of the locomotive, which is often all needed to make time.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Austin & Northwestern.—The first track is laid from Austin, Tex., west by north 16 miles.

Chicago, Milwaukee & St. Paul.—On the Council Bluffs Extension track is laid from Perry, Ia., west to Coon Rapids, 38 miles; also from Hecla, Ia., east 20 miles and west 10 miles.

Genesee Valley.—Extended northeast to Cuba, N. Y., 4 miles.

Minneapolis & St. Louis.—Extended from Ogden, Ia., southward to Angus, 13 miles.

Missouri, Kansas & Texas.—The *Southwestern Extension* is extended from Waco, Tex., southward to Temple, 47 miles.

Missouri Pacific.—The *Omaha Extension* is extended from Sheridan, Neb., northward to Weeping Water, 30 miles.

This is a total of 178 miles of new railroad, making 1,001 miles thus far reported for 1882, against 501 miles reported at the corresponding time last year, 753 miles in 1880, and 241 miles in 1879.

THE RAILROAD COMMISSION BILL now before the New York Assembly, and, it is said, likely to pass, is the one reported by Mr. C. S. Baker, who was a member of the Assembly Investigating Committee. It establishes a board of three Commissioners, to hold office for five years, whose qualifications are not otherwise prescribed than by saying that they shall be "competent" and that they shall not be in the employ of any railroad company, owners of any railroad stock or bonds, or "interested in any firm or corporation having business relations with any railroad corporation." The Commissioners are to receive a salary of \$8,000 a year each, and have a clerk paid \$4,000 a year. They are to have the general supervision of all railroads or highways, keep themselves informed as to their safety and the accommodations afforded, investigate accidents, inquire into any violation or neglect of the law, and cases of discrimination in charges; make recommendations as to improvements of road or equipments, changes in rates or method of operating that may seem to the Commissioners desirable, and, after giving the roads a hearing on the subject, report the case to the Attorney-General or to the Legislature in their annual report. In this annual report the Commissioners shall make suggestions as to the general railroad policy of the state, and they shall draft such bills as they think the Legislature should pass to protect the public interest with regard to railroads, and hear testimony for and against any proposed change in railroad legislation. They shall have power to prescribe the form of the annual report of the railroads now made to the State Engineer. They may employ engineers, accountants and other experts temporarily for investigations. They are forbidden to ask or receive passes under penalty of forfeiture of office.

The duties of the Commissioners by this bill are nearly the same as those of the Massachusetts Commission—that is, it is an investigating commission.

An amendment has been introduced taking the appointment of the Commissioners from the Governor and giving it to the Legislature, and naming as the first board Mr. Wm. Dowd, President of the Bank of North America, New York city; Mr. John R. Putnam, a lawyer of Saratoga, and Mr. Horatio Seymour, Jr., the late State Engineer and Surveyor. These are men of high character and much more ability than those who generally hold office in New York or elsewhere. Mr. Dowd, to qualify, would have to resign the presidency of the Hannibal & St. Joseph Railroad, which he has held for several years. Mr. Seymour is an engineer of reputation, and has, besides, his official experience, which, however, gives no insight into railroad business. In a commission of this kind, the questions which most frequently come up are those within the field of the traffic manager—questions of rates, differences, etc. But a commission of men with good heads on their shoulders, and disposed to study and investigate, would learn a great deal in the course of a few years, especially if there were many complaints and arguments.

The choice of such a body by the Legislature may seem a violation of administrative principles, which require that the chief executive, being held responsible for his whole administration, should select his subordinates; but, in the first place, these principles are already violated by the very constitution of New York, where the officers which properly form the Governor's cabinet are elected; and, second, the proposed commission is rather an aid to the Legislature than an administrative body. Probably, on the average, however, we would get better commissioners from the Governor than from the Legislature.

THE NEW YORK, PENNSYLVANIA & OHIO RAILROAD by reason of its position and the nature of its traffic always suffers more in proportion from a trunk-line war than almost any other road, and yet it has less power to make or mar rates than most others, because not much of its traffic in either direction originates on its own line. This is illus-

trated by its experience last year, as shown in its annual report, a summary of which we publish elsewhere. Compared with 1880, its passenger traffic increased 17½ per cent. and its freight traffic 28½ per cent.—enormous increases—but its gross earnings increased but 4½ per cent., and its net earnings decreased 3.6 per cent. The company, after paying about \$238,000 for cars under a car trust, \$52,000 for improvements, and interest on but \$8,000,000 of its \$86,610,000 of bonds outstanding, had less than seven thousand dollars left from the profits of the year. That is, a road in a well-peopled and productive country, with an absolutely large traffic and earning nearly \$10,000 per mile, was compelled to accept rates so unprofitable that it could pay interest on less than \$16,000 per mile. How much the railroad war had to do with it may be judged by the fact that at the rates of 1880 the freight alone would have yielded more than a million of net earnings more than was actually obtained, and also that in the first half of the year, with but two weeks of railroad war, the average rate received per ton per mile was 0.733 cent.; in the last, which was all railroad war, it was but 0.579 cent., while the average cost for the whole year was 0.509 cent. A road that hauls a 10-ton car of freight 500 miles for \$28.95, and pays out \$25.45 of it for expenses, must have an enormous traffic in order to make much money.

Though the gross earnings were a little more in 1881 than in 1880, in the last half of the year they were less—\$2,764,124 in 1881, against \$2,843,708; and the net earnings in this half decreased from \$947,445 in 1880 to \$820,634. There was a small increase in the average rate on local freight, and a considerable increase in the amount, but the average rate on through freight fell from 0.717 to 0.515 per cent., so that in spite of an increase of more than one-third in the amount of it, there was a decrease of \$60,000 in the earnings from it. The local passenger traffic increased 12½ per cent., with a slight decrease in the rate, resulting in an increase of 10½ per cent. in earnings; the through passenger traffic increased 22½ per cent., but the rate on it fell off 11½ per cent., and the increase in earnings was but 8 per cent.

The turning of the Erie's freight lines to this road at the beginning of this year must have given it a very considerable addition to its freight traffic; this, with good rates, should greatly increase its profits; but the whole effect of the better rates will not be felt much until after June, this year.

CHICAGO SHIPMENTS EASTWARD for the week ending March 11 were 47,567 tons, against 48,681 tons the week before, 52,968 in the corresponding week of last year, and 67,413 in the corresponding week of 1880, when, throughout March, the shipments were extraordinary. The shipments this year are the smallest since November, and, with one exception, are the smallest since the middle of June. They are, however, very little smaller than in the two previous weeks.

Of the shipments of the week 7 per cent. was carried by the Grand Trunk, 25.7 by the Michigan Central, 24.4 by the Lake Shore, 28.2 by the Fort Wayne, 8.3 by the Pan-handle, and 6.4 per cent. by the Baltimore & Ohio. The two Vanderbilt roads had 50.1 per cent. of the whole, against 49 in the late pool; the two Pennsylvania roads had 36.5 of the whole, against 33 in the pool. The Fort Wayne now shows, but has only lately begun to show, the effect of the running of the Erie's freight lines over it.

For the months of January and February the Chicago shipments have been, for four successive years:

| | 1879. | 1880. | 1881. | 1882. |
|---------------|---------|---------|---------|---------|
| January..... | 162,512 | 163,378 | 263,872 | 321,166 |
| February..... | 198,541 | 166,541 | 204,351 | 225,816 |

Two months 391,053 329,919 468,203 546,982

We see thus that the February shipments were larger this year than in any previous year, but not so much larger as the January shipments. In February the increase was 10½ per cent. over 1881, 36 per cent. over 1880, and 13½ per cent. over 1879. Shipments were large this year in the first three weeks of February, but have been light ever since. Nevertheless there was an immense decrease from January to February, the daily average being 12,353 tons in January and 9,409 in February. There is usually not much difference between the two months, as will appear above.

Of the shipments in February the Grand Trunk carried 12.6 per cent., the Michigan Central 29.9, the Lake Shore 17.5, the Fort Wayne 23.5, the Pan-handle 10.3, and the Baltimore & Ohio 6.2 per cent.

For the week ending March 18 the records of the Chicago Board of Trade (published in the *Chicago Tribune*) show that the shipments of freight billed from Chicago over these roads amounted to 39,571 tons, against 30,565 tons the previous week and 48,332 in the corresponding week of last year. Last week 10,355 tons of the freight shipped were flour, 22,960 grain, and only 6,259 tons were provisions. As usual, the two Pennsylvania roads carried most (nearly 60 per cent.) of the provisions; but the whole was too small to affect their percentage much.

THE ADVISORY COMMISSION has heard nearly the same kind of arguments from Philadelphia and Baltimore that was offered in New York, special stress, of course, being placed on the shorter distance to the West from these places. This was generally exaggerated, however, by taking the shortest distance to Baltimore and comparing it with the longest distance to New York, and in one case a Western city was selected which is much further from New York than from Baltimore, but which, unfortunately for the argument, does not supply one-thirtieth of the total traffic. A great point was made of the cheapness of coal on the Maryland and Pennsylvania roads. But, as in New York, the merchants wanted an allowance for the cheapness with which traffic can be carried to and from their

respective ports, and another for the dearth attending it—one allowance for their advantages and another for their disadvantages.

We confess that the whole discussion of this question at all the places has greatly lessened our respect for the intellectual ability of the mercantile class. So far as they have been represented at these hearings, they seem to have done very little thinking on a question which they say concerns them vitally, and to be totally unable to argue it effectively. They have in every place had much to say of the cheapness of carriage to that place; but they have based their statements on very vague grounds. If one of these merchants had a suit at law involving a few thousand dollars, he would have employed able counsel, and, if necessary, secured expert testimony to establish the facts bearing on his case. One would suppose that the associated merchants of a great city might have contrived to do at least as much in a case concerning them all.

A NEW YORK-BOSTON FAST TRAIN is to be put on by the Boston & Albany and the New York, New Haven & Hartford companies about June 1. The present intention is to limit the train to one baggage car and four drawing-room cars, and to start it from each end of the line about 5 p. m. The train is to make the run of 234 miles in five hours, or at an average speed of 46.8 miles an hour, making regular stops only at New Haven, Hartford and Springfield. The fastest time will be made on the 74 miles between New York and New Haven, which the train is expected to cover in 90 minutes, or at the rate of 49.3 miles an hour. Now, while no stops will be made at stations, it will be necessary for the train to stop at least four times on this division at draw-bridges, where a full stop is required by law, so that a speed of 60 miles an hour, over part of the road at least, will be necessary to make time. The New Haven company is building two engines in its shops for this train especially. They have 18 by 24-in. cylinders and driving wheels 7 ft. in diameter.

No very fast time has hitherto been made between Boston and New York. The best time made by any train now running by the Springfield route lacks but three minutes of seven hours, the average speed being 33.4 miles an hour, while two of the four daily express trains take eight hours to the trip, running at the rate of 29.3 miles an hour, which does not at all compare with the time made between New York and Philadelphia for some years past. By the Shore Line, which is six miles shorter, the time is about the same, one train each way making the run in about seven hours and the other in eight. The six miles of distance gained on this route, however, are about balanced by the ferry crossing at New London, so that the average speed is the same. The best time now made between New York and New Haven is two hours.

NEGOTIATIONS FOR THE TRUNK LINE PASSENGER POOL have been going on for a week past, and satisfactory progress is said to have been made in approximating the terms of the contract by which the earnings will be divided. There are many details to be attended to, and, there being no precedent for the kind of division contemplated, the way is not as clear as if it had been often followed before. But the difficulties are entirely in the nature of the problem and not in lack of harmony or great differences of opinion. On the contrary, there is great unanimity in purpose and evidently all the companies are fully in earnest.

THE "ORIGIN AND DESTINATION OF TRUNK LINE FREIGHT" was the subject of some remarks in our last issue, based on tables of the tons of shipments east over the trunk lines from each Western competing point, and of the shipments west from the seaboard to these points. These tables, we said, were for 1881. Actually they were for 1880, and therefore they must not be taken as representing the recent course of traffic.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:
Denver & Rio Grande, annual meeting, at Colorado Springs, Col., April 3.
Pennsylvania, annual election, at the general office No. 233 South Fourth street, Philadelphia, March 28. Polls will be open from 10 a. m. to 6 p. m.

Dividends.

Dividends have been declared as follows:
Oregon & California, 2 per cent. on the preferred stock from the earnings of 1881.
East Tennessee, Virginia & Georgia, 2½ per cent. on the income bonds from the earnings of the six months ending Dec. 31, payable April 1.
St. Louis, Jacksonville & Chicago (leased to Chicago & Alton), 3½ per cent. on preferred and 6½ per cent. on common stock, payable April 10.
Danbury & Norwalk, a dividend at the rate of 5 per cent. a year from the earnings of the four months ending March 31, payable April 4.

American Society of Mechanical Engineers.

The regular meeting at Philadelphia has been postponed until Wednesday, April 19. Members residing in Philadelphia are requested to assist the Local Committee in making preparations. Members are requested to send their papers to the Secretary in ample time for reference to the Committee on Publication. The Council urge that each member should present at least one carefully-prepared paper, however short, each year, and make special effort to attend the meetings and take part in the debates. At the meeting before the reading of the papers there will be a discussion upon papers presented in 1881, copies of which have been sent to all members. Members can obtain from the Secretary tickets of invitation for friends who wish to join the Society.

Association of American Railroad Superintendents.

The third meeting of the Association of American Railroad Superintendents will be held at the rooms of the National Railway Club, No. 46 Bond street, New York city, on Wednesday, April 19, 1882, at 10 o'clock a. m.

Business to come before the meeting:

1. The election of honorary and other members.
 2. Presentation of communications received since last meeting.
 3. Reports from committees.
 4. The consideration of such other business as may be presented.
- Superintendents who have signified their intention of becoming members of the Association are invited to be present at this meeting.

National Association, General Passenger & Ticket Agents.

The annual meeting of this Association began on March 21 at the Railroad Club Rooms, No. 46 Bond street, New York. President W. B. Shattuck occupied the chair and about 90 members were present.

The entire session of the first day was occupied in a discussion of the limited ticket question. Several plans were proposed which would prevent the use of such tickets beyond the limit, and also their sale to scalpers. Finally the whole question was referred to a committee, with instructions to report at the semi-annual meeting in September. The committee consists of Messrs. H. C. Townsend, Francis Chandler, James Charlton, C. J. Waller, W. P. Johnson, C. K. Lord, John N. Abbott, E. A. Ford, E. F. Wilson, C. F. Atmore, S. C. Boylston, W. A. Thrall, George F. Boyd, J. Wilder and George B. Campbell.

It was decided to hold the fall meeting in Montreal, Sept. next.

On the second day, March 22, the subject of paying passenger commissions was taken up and, after some discussion, referred to a committee, to report at the next meeting.

A resolution was adopted instructing ticket agents to be more careful hereafter in fixing dates on limited tickets.

The greater part of the session was occupied in discussion of the proposed plans for pooling passenger business from competitive points. It is expected that the pool agreements, if concluded, will settle or dispose of many points which have heretofore caused much discussion in the Association.

After electing officers, the Association adjourned, to meet in Montreal in September.

Trunk Lines Advisory Commission.

The Advisory Commission held its last session in Philadelphia on March 16, when an argument against the claims of New York was presented by a committee of the Maritime Exchange. This argument was largely devoted to a presentation of the advantages presented by Philadelphia in terminal facilities.

Shorter arguments were presented by committees from the Produce Exchange and the Drug Exchange, and a Mr. Lockwood presented an address against the policy of the Pennsylvania Railroad Company.

The members of the Commission visited the terminal stations of the Pennsylvania and the Reading roads.

The hearing in Philadelphia was closed by an argument presented by a committee from the Board of Trade of Newark, N. J., in favor of differential rates.

The hearing in Baltimore was opened on March 18, when a long and elaborate argument was presented by Mr. Henry C. Smith, President, for the Merchants and Manufacturers' Association, setting forth the claims of Baltimore to lower rates than New York and Philadelphia.

On March 20 the Commission listened to another elaborate presentation of the claims of Baltimore, made by a committee from the Corn and Flour Exchange.

The session in Baltimore was closed on March 21, when the argument of the Board of Trade was presented, dealing chiefly with the claim that the lines to Baltimore were not only shorter than those to New York, but could be more cheaply operated.

After the close of the hearing the Commission made a trip around the harbor, viewing the elevators and shipping facilities at Canton and Locust Point.

ELECTIONS AND APPOINTMENTS.

Austin & Northwestern.—The officers are: President, J. A. Rhomburg; General Manager, H. W. McNeill; Chief Engineer, T. A. Hill. Offices at Austin, Texas.

Bangor & Piscataquis.—At the annual meeting in Bangor, March 15, the old board was re-elected as follows: A. M. Robinson, Dover, Me.; Newell Blake, M. S. Drummond, Moses Giddings, F. S. Moore, John S. Ricker, Arad Thompson, A. G. Wakefield, J. S. Wheelright, F. A. Wilson, Bangor, Me. The board re-elected Moses Giddings President; H. W. Blood, Clerk and Treasurer; Arthur Brown, Superintendent.

Boston Society of Civil Engineers.—At the annual meeting in Boston, March 15, the following officers were chosen: President, Thomas Doane; Vice-President, Edward S. Philbrick; Secretary, S. Everett Tinkham; Treasurer, Henry Manley; Librarian, Charles W. Kettell; Auditor, Wm. H. Bradley.

Central, of New Jersey.—The board has elected Henry S. Little President, in place of Francis S. Lathrop, deceased. Mr. Little is also Receiver of the road.

Chesapeake & Ohio.—At the annual meeting in Richmond, March 16, the old directors were re-elected as follows: Williams C. Wickham, Richmond, Va.; John C. Echols, Staunton, Va.; John Castree, A. S. Hatch, Elias S. Higgins, Jesse Hoyt, C. P. Huntington, Abiel A. Low, A. E. Orr, Edward T. Tournier, Ezra Wheeler, New York.

Mr. H. O. Canfield has been appointed Agent at Peoria, Ill. He was for some years General Freight Agent of the Peoria, Pekin & Jacksonville Railroad, and is at present Secretary of the Peoria pool and of the Illinois Protective Railroad Rate Association.

Mr. J. C. Ernst has been appointed General Southern Passenger Agent, with office in Louisville, Ky. He was formerly General Passenger Agent of the Kentucky Central road.

Chicago & Eastern Illinois.—Mr. Wm. Hill has been appointed General Passenger and Ticket Agent in place of A. S. Dunham. Mr. Dunham continues Secretary and Auditor of the company.

Chicago General Passenger Agents' Association.—The following officers have been elected for the ensuing year: President, James Charlton, Chicago & Alton; Vice-President, W. C. Johnson, Lake Shore & Michigan Southern; Secretary, W. H. Dixon; Executive Committee, A. V. H. Carpenter, A. H. Hanson, Percival Lowell.

Chicago & Great Southern.—At a meeting held in Goodland, Ind., the following directors were chosen: G. W. McDonald, Fountain County, Ind.; H. Moore, Hamilton County, Ind.; D. H. Conklin, Harry Crawford, Harry

Crawford, Jr., F. F. Lacey, D. J. Lyon, H. Meisbar, W. A. Starin, Chicago. The board elected Harry Crawford President; Harry Crawford, Jr., Secretary and Treasurer; D. H. Conklin, Superintendent of Construction.

Chicago & Iowa.—The new board has elected F. H. Head President; J. L. Lathrop, Vice-President; L. O. Goddard, Secretary; J. C. Peasley, Treasurer. Mr. Head is the present owner of the stock formerly held by the city of Aurora; the other officers are all officers of the Chicago, Burlington & Quincy Company.

Chicago & Pacific.—The following directors were chosen on March 14: Leslie Carter, J. W. Cary, J. D. Harvey, S. S. Merrill, Alexander Mitchell, C. D. F. Smith, E. Walker. The road is owned by the Chicago, Milwaukee & St. Paul.

Cincinnati Northern.—Mr. George L. Barringer has been appointed General Manager. He was at one time Superintendent of the Indianapolis, Cincinnati & LaFayette road.

Cleveland & Pittsburgh Railroad Mutual Benefit Association.—At the annual meeting last week the following officers were chosen: President, M. V. Miller; Vice-Presidents, Thomas Dickson, U. Venning, E. S. Taylor; General Secretary, T. R. Andrews; Treasurer, G. N. Bruner; Executive Committee, O. F. Jenkins, J. W. Menough, D. McBan, R. Rand, L. Beeny.

Eastern Shore.—At a meeting held in Princess Anne, Md., March 21, the following directors were chosen: D. B. Cummings, H. H. Dashiell, George R. Dennis, Samuel M. Felton, William H. Gale, John T. Gause, Samuel Harlan, Thomas Humphreys, Levin Woolford, William H. Roach, William L. Schaffer, Willard Thomson, E. Stanley Toadvine.

Grand Tower & Carbondale.—The directors of this new company are: John Storms, Jr., J. D. Waters, Thomas M. Williamson, Grand Tower, Ill.; Thomas G. Allen, Ethan Allen Hitchcock, St. Louis.

Knox & Lincoln.—At the annual meeting in Rockland, March 15, the following directors were chosen: John F. Berry, Francis Cobb, G. W. Kimball, Rockland, Me.; Edmund Wilson, Thomaston, Me.; E. O. Clark, Waldoboro, Me.; Henry Ingalls, Wiscasset, Me.; T. W. Hyde, George A. Preble, Bath, Me.; F. G. Richardson, Portland, Me. Messrs. Kimball and Hyde are new directors, succeeding D. W. Chapman and Edwin Flye.

Massachusetts Central.—Mr. S. H. Munson has been appointed Acting Superintendent.

Minneapolis & St. Louis.—At a meeting of the board held March 17, Mr. A. B. Stickney was chosen a director in place of A. H. Bode, resigned. The board then elected Mr. Stickney Vice-President in place of H. T. Wells resigned. It is understood that Mr. Stickney will assume most of the duties heretofore performed by President Washburn, and will have especial charge of the extension of the road. He was formerly Superintendent of Construction of the St. Paul, Minneapolis & Manitoba, and recently Superintendent of the Canadian Pacific.

Missouri Pacific.—The new board has elected Jay Gould President; R. S. Hayes, First Vice-President; A. L. Hopkins, Second Vice-President; A. H. Calef, Secretary and Treasurer; Wm. Arnold, Assistant Secretary.

National Association, General Passenger & Ticket Agents.—At the annual meeting in New York, March 22, the following officers were chosen: President, E. P. Wilson, Cincinnati, New Orleans & Texas Pacific; Vice-President, Lucius Tuttle, Eastern; Secretary, A. J. Smith, Cleveland, Columbus, Cincinnati & Indianapolis.

New York & New England.—The following circular from General Manager Felton is dated Boston, March 15: "On and after April 1 the headquarters of the Transportation Department will be located at Hartford, Conn."

"Mr. J. C. Rawn, Superintendent Western Division, having resigned, the office is hereby abolished. Communications heretofore addressed to Mr. Rawn should be sent to Mr. O. M. Shepard, Superintendent of Transportation at Hartford."

Pennsylvania Company.—Mr. J. W. Clawbaugh has been appointed Train-Master of the Ashtabula Division in place of W. C. Parker, resigned.

Peoria, Decatur & Evansville.—The board has elected the following officers: C. R. Cummings, President; G. L. Bradbury, Vice-President and General Manager; J. G. Martin, Second Vice-President; John V. Carse, General Counsel; R. A. Bunker, Treasurer; B. G. Mitchell, Secretary.

Phoenixville & West Chester.—The officers of this new company are: President, J. N. DuBarry; directors, A. J. Cassatt, George M. Dorrance, John P. Green, George B. Roberts, N. Parker Shortridge, Edmund Smith, Henry D. Welsh, John Price Wetherill.

Pittsburgh, Cincinnati & St. Louis.—At the annual meeting in Columbus, March 21, the following directors were chosen: David S. Gray, Columbus, O.; George W. McCook, Steubenville, O.; Wm. H. Barnes, J. N. McCullough, Thos. D. Messler, Wm. Thaw, Pittsburgh, Pa.; J. N. DuBarry, John P. Green, Henry H. Houston, Wistar Morris, George B. Roberts, J. Price Wetherill, Philadelphia; Robert Sherard, Jr., New York. The only new director is Mr. McCook, who succeeds Mr. A. J. Cassatt.

Raleigh & Gaston.—Major John C. Winder, for a long time General Superintendent, has been appointed General Manager. He is also General Manager of the Raleigh & Augusta Air Line and the Carolina Central roads.

Richmond & Petersburg.—Major E. D. T. Myers has been appointed Superintendent in place of T. D. Kline, resigned. Major Myers will still retain his position as General Superintendent of the Richmond, Fredericksburg & Potomac road and President of the Petersburg Company.

Sabine & East Texas.—Mr. John B. Morford has been appointed General Superintendent. Mr. Morford is Superintendent of Ferries of the Central Railroad, of New Jersey, and will retain that position, receiving leave of absence for three months to go to Texas.

St. Louis, Iron Mountain & Southern.—The new board has elected Jay Gould President; R. S. Hayes, First Vice-President; Thomas T. Eckert, Second Vice-President; A. H. Calef, Secretary and Treasurer; S. D. Barlow, Assistant Secretary.

Sandy River.—At the annual meeting held March 15 the following directors were chosen: N. B. Beal, D. L. Denison, W. F. Fuller, Phillips, Me.; D. M. Binney, Farmington, Me.; P. H. Stubbs, Strong, Me. The board re-elected N. B. Beal President.

Socorro, White Oaks & Texas.—The directors of this new company are: Isaiah H. Corbin, W. G. Corbin, C. C. Howell, Santa Fe, N. M.; Charles A. Ball, Columbus, O.; J. W. Gould, New York.

South Carolina.—The directors are now as follows: W. H.

Brawley, Andrew Simonds, Charleston, S. C.; E. E. Chase, John H. Fisher, H. C. Hardy, J. J. Higginson, Samuel Sloan, F. A. Stout, Henry P. Talmadge, New York.

Texas-Mexican Northern.—The directors of this new company are: W. R. Chisholm, F. W. Getty, M. M. Reynolds, A. A. Woolston, Laredo, Tex.; Theodore H. Friend, John Pratt, New York.

Toledo, Cincinnati & St. Louis.—At the meeting held in Toledo, O., March 21, the following directors were chosen for this consolidated company: John M. Corse, Henry D. Hyde, S. C. Blanchard, Oliver Ames, R. M. Pomeroy, Wm. A. Haskell, W. D. Hobbs, George Ripley, C. W. Pierce, E. B. Phillips, Pliny Nickerson, W. D. Forbes, John McNab, George W. Ballou, George D. Kniesley. They represent mainly the new subscribers to the securities of the company, who have raised a sum of money sufficient to complete the extensions of the road.

Watertown & Boston.—This company was organized at Watertown, Mass., March 21, by the election of the following: Directors, D. B. Flint, Samuel Walker, George N. March, J. H. Conant, R. L. Davis, George K. Snow, George H. Sleeper, Edward E. Allen, H. C. Derby, Hiram Whitney, R. P. Stack, Miles Pratt, Clerk, Edward Allen; Treasurer, George N. March.

PERSONAL.

—Mr. T. W. Garrett has resigned his position as Train-Master of the Atlanta & Charlotte Air Line Division of the Richmond & Danville road.

—Mr. D. Wishart, General Passenger Agent of the St. Louis & San Francisco road, was married on March 22 to Miss Effie Maddox, of Kansas City.

—Mr. John Rumsey, a wealthy and influential banker, died at his residence in Ithaca, N. Y., March 19, aged 60 years. He was a director of the Geneva, Ithaca & Sayre Company.

—Hon. Arthur P. Gorman, for some years president of the Chesapeake & Ohio Canal Company, tendered his resignation at a special meeting of the stockholders on March 21. The resignation was not accepted, but was laid over until the annual meeting in June. Mr. Gorman is now United States Senator from Maryland.

—Mr. Daniel Kilgore, for several years past Assistant to the Eastern Passenger Agent of the Pennsylvania Railroad, died March 21 at his residence in Elizabeth, N. J., of pneumonia. He had been for some time in charge of the immigrant business in New York. He was 46 years old, and had been for 22 years in the company's service.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

Two months ending Feb. 28:

| | 1882. | 1881. | Inc. or Dec. | P. c. |
|-----------------------|-----------|-----------|--------------|-------|
| Ala. Gt. Southern. | \$118,116 | \$122,053 | D. | 3.37 |
| Buff. Pitts. & W. | 101,589 | 79,846 | I. | 27.32 |
| Net earnings.... | 51,821 | 17,620 | I. | 194.3 |
| Central Iowa..... | 168,066 | | | |
| Grand Trunk..... | 1,503,801 | 1,535,896 | D. | 2.3 |
| Or. Ry. & Nav. Co. | 274,100 | 294,058 | I. | 128.5 |
| Phila. & Reading..... | 2,733,495 | 2,635,559 | I. | 3.7 |
| Net earnings.... | 1,000,095 | 1,030,961 | D. | 3.0 |

Month of January:

| | 1882. | 1881. | Inc. or Dec. | P. c. |
|--------------------|-------------|-------------|--------------|-------|
| Chi., Bur. & Quin. | \$1,658,893 | \$1,307,947 | I. | 26.8 |
| Net earnings.... | 709,414 | 596,035 | I. | 19.1 |
| G. H. & San Ant. | 96,846 | 115,193 | D. | 15.9 |
| Grand Trunk..... | \$161,925 | \$164,250 | D. | 1.4 |
| Net earnings.... | 27,503 | 37,396 | D. | 26.7 |

Month of February:

| | 1882. | 1881. | Inc. or Dec. | P. c. |
|-----------------------|-----------|-----------|--------------|-------|
| Ala. Gt. Southern. | \$57,541 | \$63,545 | D. | 9.4 |
| Buff. Pitts. & W. | 48,505 | 40,024 | I. | 21.2 |
| Ches. & Ohio..... | 209,700 | 184,309 | I. | 13.8 |
| Central Iowa..... | 80,759 | | | |
| Ev. & Terre Haute. | 56,774 | 45,222 | I. | 25.7 |
| Or. Ry. & Nav. Co. | 281,000 | 160,377 | I. | 75.8 |
| Phila. & Reading..... | 1,290,420 | 1,336,427 | D. | 3.4 |
| Net earnings.... | 416,092 | 531,321 | D. | 21.7 |

First week in March:

| | 1882. | 1881. | Inc. or Dec. | P. c. |
|--------------------|-----------|-----------|--------------|-------|
| Grand Trunk..... | \$199,159 | \$195,302 | I. | 2.0 |
| Great Western..... | 90,554 | 102,702 | D. | 11.8 |

Second week in March:

| | 1882. | 1881. | Inc. or Dec. | P. c. |
|---------------------|----------|----------|--------------|-------|
| Chi. & Gt. Trunk. | \$37,094 | \$23,601 | I. | 57.2 |
| Chi. & East. Ill. | 28,308 | 30,631 | D. | 7.6 |
| Chi., Mil. & St. P. | 340,000 | 187,205 | I. | 81.7 |
| Chi. & N. W. | 355,100 | 239,300 | I. | 48.4 |
| C. H. Vy. & Tol. | 49,249 | 47,592 | I. | 3.4 |
| Denver & R. G. | 120,737 | 82,376 | I. | 46.8 |
| Han. & St. J. | 41,800 | 39,900 | I. | 4.8 |
| Louisv. & Nash. | 241,240 | 219,400 | I. | 9.9 |
| Northern Pacific. | 86,800 | 38,030 | I. | 128.3 |
| St. L. & San. Fran. | 59,700 | 64,000 | D. | 6.7 |
| St. P., M. & Man. | 145,009 | 76,000 | I. | 90.8 |
| Wab., St. L. & P. | 344,373 | 312,702 | I. | 10.1 |

Grain Movement.

For the week ending March 11, receipts and shipments of grain of all kinds at the eight reporting Northwestern markets, and receipts at the seven Atlantic ports, have been, in bushels, for the past six years:

| Year. | Northwestern receipts. | Northwestern shipments. | Atlantic receipts. |
|-----------|------------------------|-------------------------|--------------------|
| 1877..... | 1,195,040 | 698,134 | 1,721,935 |
| 1878..... | 2,377,784 | 2,586,123 | 3,385,861 |
| 1879..... | 2,936,201 | 2,007,797 | 4,006,145 |
| 1880..... | 3,778,365 | 2,593,032 | 4,224,824 |
| 1881..... | 2,505,482 | 1,849,551 | 3,467,379 |
| 1882..... | 1,702,086 | 1,590,487 | 1,610,473 |

The receipts of the Northwestern markets for the week were 800,000 bushels (32 per cent.) less than in the corresponding week of last year, 2,076,000 bushels (45 per cent.) less than in 1880, and the smallest since 1877. They were nearly the same in each of the two weeks previous, but with these exceptions are the smallest for more than a year. The shipments of these markets were a little less than in the corresponding week of last year, 1,000,000 bushels (38½ per cent.) less than in 1880, and the smallest since 1877. They were a trifle more than the week before, but with that exception are the lightest since the first week in January. Of the shipments 132,156 bushels, or 8.3 per cent., went down the Mississippi. The Atlantic receipts of the week were smaller than in any corresponding week since 1875, and were not half as large as in any of the four previous years. They are also the smallest for eight weeks, and smaller than in any week of 1881, 1880, 1879, or 1878, or of 1877 after March.

Of the Northwestern receipts for the week Chicago had 38.3 per cent., St. Louis 18.8, Peoria 17.7, Milwaukee 14.4, Toledo 4.9, Cleveland 4.0, and Detroit 1.9 per cent. Compared with the previous week there was a gain at Chicago and a loss at St. Louis, but the changes are not at all noticeable.

Of the Atlantic receipts, New Orleans had 40.5 per cent., New York 33.7, Boston 14, Baltimore 4.9, Philadelphia 4.1,

twice as great this year as last in February, and for the two months considerably more than twice as great, the exports to countries other than the United States having been 42,325 tons in 1880, 39,774 in 1881, and 80,878 in 1882. There is an increase in the exports to every country, without exception. Next to this country stand Australia, British India, Brazil and Italy, but ahead of all these are other countries, which have taken 25,293 tons this year, against 13,571 last and 9,405 in 1880. Mexico probably receives the largest part of these shipments.

The Preservation of Timber.

The American Society of Civil Engineers has appointed a committee to investigate this subject, which has issued a circular asking the following questions:

"1. Do you know about, or can you ascertain the result of, past experiments in preserving wood in this country?"

"2. If so, when and where?"

"Kindly give us the name and address of persons who can furnish further information on this subject."

The committee will be glad to receive information from any source, and those who have not received the circular may communicate with O. Chanut, Box 839, New York city, chairman of the committee, the other members of which are: B. M. Harrod, New Orleans; G. Bouscaren, Cincinnati; E. R. Andrews, New York; E. W. Bowditch, Boston; Col. G. H. Mendel, San Francisco; C. Shaler Smith, St. Louis, and J. W. Putnam, New Orleans.

Fire Extinguisher for Passenger Cars.

Frank A. White, of Cortlandt, has received a patent for an automatic fire extinguisher for railroad cars. This invention consists of tanks containing chemicals in solution provided with valves and connected with portions of the car, in such a manner that liquid will be automatically liberated in case of collision. It is a peculiar and ingenious contrivance, and the inventor has perfect faith in its capabilities.—*Utica (N. Y.) Herald.*

A Boy Train Wrecker.

The New York Evening Post of March 22 says: "Within the last three days two trains on the Hudson River Railroad have been thrown from the tracks at High Bridge by misplaced switches. It was thought they had been tampered with, and last night George Flynn, an employe of the road, detected Willie Kyle, nine years old, living at High Bridge, endeavoring to turn a switch. Officer Siebert, of the Thirtieth Precinct, was notified, and he took the little fellow in custody. In the Harlem Police Court this morning he was held for trial."

Outwitting a Business Firm.

The sequel to that little tale of a few weeks ago, where the First National Bank was out \$5,000 in good cash and in a bundle of worthless paper instead, said to have been delivered them by one of the express companies, is still forthcoming, and the probabilities are it always will be. The occurrence brings to mind an incident in the express business that happened in Cincinnati something less than a hundred years ago, and in which a prominent local firm was identified. If false be correct, and it is in this instance at least, this prominent local firm was in the habit of sending large sums of money through the medium of the United States Express Company. The amounts frequently exceeded \$5,000, and as the firm's business grew in extent so also did the bills for expressage. Time passed on and the firm continued its dealings with the express company, but it was noticeable that the amounts transmitted were smaller than they had been in days of yore, though the packages were still of the uniform size. Right here it is meet to remark that in sending money the express company charges you in proportion to the amount they handle for you. Thus, it costs just about half as much to send \$2,000 by express as it would to send \$5,000. So much for explanations. For months this thing continued, the firm sending away their money packages, but never marking on their envelopes more than \$2,000. One day the agent of the company took it into his head to examine one of these two-thousand-dollar packages. The envelope was opened and the money counted, and the discovery was made that the amount inclosed was \$5,000 instead of \$2,000, though the latter figure found place upon the package in the writing of the firm. Of course that created a sort of a stir in the camp of the company. The agent resealed the package, but not before he had extracted \$3,000 from the little pile and transferred it into his own vault for safe-keeping. The envelope was sent to the party addressed. It was delivered and the receipt taken. To say that there was a rumour on the other end of the line when the lucre was counted is drawing it rather mild. That express agent was at once visited, and it was explained that there was \$5,000 in the package when sent, and that but \$2,000 remained when it was delivered. The agent said he guessed that there was some mistake; that the firm held no receipt for \$5,000; that \$2,000 was all the firm was charged for, and he exhibited the figures in black and white to the worried firm to prove it. The upshot of the whole matter was that this prominent local firm up and acknowledged their attempts to defraud the express company, and placed their books at the disposal of the company for them to ascertain how much they had been beaten out of. The firm settled up the necessary damages and received its \$3,000 back, and it is safe to say that since then they have paid for every dollar ever sent by express.—*Cincinnati Enquirer.*

OLD AND NEW ROADS.

Atlantic, Mississippi & Ohio.—In the United States Circuit Court in Richmond, Va., March 17, a decree was entered as to the disposition of the remaining funds derived from the sale of this road under foreclosure. The petition of Gen. Mahone for salary, expenses and attorney's fees and clerk hire in defending the suit as President, was dismissed, but he was allowed, by consent of all parties interested, the sum of \$30,000. The clerk of President Mahone was allowed \$2,500 for his services. Mr. M. F. Pleasant, the Master in the case, was allowed \$7,500. Messrs. Perkins and Fink, Receivers of the road, were allowed \$7,500 each, to be credited by certain amounts which had heretofore been paid them as salary (about \$4,000). C. S. Stringfellow, as attorney for President Mahone, was allowed \$1,000.

John S. Wise was selected as the attorney to pay all labor and supply claims as allowed by the decree.

Austin & Northwestern.—The first section of this road, from Austin, Texas, to Burnet, is graded, and the rails have been laid for 16 miles from Austin. Two construction trains are on the road.

Birmingham & Guntersville.—This company has been organized to build a railroad from Birmingham, Ala., north by east to Guntersville on the Tennessee River, about 70 miles. The line is midway between the Alabama Great Southern and the South & North Alabama roads.

Carolina Central.—A suit has been begun against this company by Mrs. Virginia B. Matthews, of New York, whose husband formerly controlled the company. At the time of the recent sale of stock to the Raleigh & Gaston people, it was understood that the Matthews claim had been settled, but Mrs. Matthews now brings suit and asks for the appoint-

ment of a receiver. The case has been set for a hearing before the Circuit Court at Goldsboro, N. C., May 12 next.

Central Elevated, of Baltimore.—Baltimore—or some people in it—wants an elevated railroad, and a bill is pending in the Maryland Legislature to incorporate the Central Elevated Railroad Company, of Baltimore, with authority, after the consent of the Mayor and City Council of Baltimore has been obtained, to construct and run an elevated steam railroad, beginning at North street bridge, along the Northern Central Railway and through North and South streets, or along the course of Jones' Falls through the city, and lateral roads east and west on Pratt street to the city limits. Absolute powers are given the company to go anywhere, to select its own route, to construct its tracks at its discretion, and to connect with any other railroads. The capital stock is placed at \$1,000,000, divided into shares of the par value of \$50. It is said that the opposition is too strong to give the bill much chance of passing.

Central Pacific.—The worst snow-storm of the year visited this road late in the season. On March 16 the road over the Sierra Nevada was badly blocked, and the blockade continued several days, a strong force of men being needed to clear the track, besides the snow-plows.

Chesapeake & Ohio.—At the annual meeting last week the stockholders voted to authorize the construction of a branch from a point near Newport News to Old Point Comfort, with the necessary station, wharves and other terminal buildings.

Chesapeake & Ohio Canal.—At a special meeting in Annapolis, March 21, a report was presented recommending the sale of that part of the canal from Rock Creek to Seventeenth street in Washington, which has been practically disused for several years; also recommending that the work of lengthening the locks be continued, and setting forth the difficulties in the way of selling repair bonds to pay for the work. The report was referred to a special committee of stockholders, to report on its recommendations.

Chicago & Iowa.—The long controversy over the control of this road has apparently been settled. The recent election places the Chicago, Burlington & Quincy in possession of the organization, and it only remains to secure the discharge of the Receiver by the Court, about which there will probably be little difficulty.

Chicago, Milwaukee & St. Paul.—On the Council Bluffs Extension trains have begun to run to Coon Rapids, Ia., 38 miles westward from the late terminus at Perry, and 175 miles from the beginning of the extension at Marion. Track is also laid from Hecla, Ia., east 20 and west 10 miles, making 205 miles finished and leaving 63 miles of track yet to be laid. Grading will soon be begun on the branch to Sioux City.

Chicago & Northwestern.—It is reported that this company will this season build a branch from Algona, Ia., west to the Missouri River. Such a line would be nearly parallel to and about half way between the Southern Minnesota and the Iowa & Dakota divisions of the Chicago, Milwaukee & St. Paul. It is not probable that the report is correct. Official statements have been made that the company this year will confine its new construction to the completion of lines already begun, and one or two short branches planned last year.

Chicago, Rock Island & Pacific.—This company has put on an additional through train to run between Chicago and Minneapolis over its own road, the Burlington, Cedar Rapids & Northern and the Minneapolis & St. Louis.

Chicago, St. Paul, Minneapolis & Omaha.—In Madison, Wis., March 14, this company filed the bonds of \$310,000 for the faithful performance of the stipulations imposed upon the company by the act transferring to it the St. Croix land grant. The bond was approved by the Governor. Its sureties are Philetus Sawyer, H. H. Porter and R. P. Flower.

Cincinnati, Hamilton & Dayton.—A dispatch from Cincinnati, March 16, says: "The directors of the Cincinnati, Hamilton & Dayton Railroad held a protracted session to-day. The meeting was looked forward to with unusual interest for the reason that it was the first meeting held by the directors since the decision of the Supreme Court declaring the consolidation of this road with the Cleveland, Columbus, Cincinnati & Indianapolis illegal. Cognizance was taken of the action of the officers in whose hands the road has been since the effort to consolidate was made. This is understood to mean that the present officers will be continued, at least until the annual meeting in June. President Devereux indicated no intention of resigning."

Cleveland, Columbus, Cincinnati & Indianapolis.—The latest report in relation to this road is that a controlling interest in the stock has been quietly secured by Mr. Hugh J. Jewett and others in the Erie interest, and that at the annual election, which will necessarily be held soon, as the Ohio consolidation has failed, an Erie board will be chosen. The control of the road carries with it a large holding of Cincinnati, Hamilton & Dayton stock, and it is said that there will be no trouble in securing the management of that road.

Connotton Valley.—The directors of this company have prepared a plan for the relief of the company from its present embarrassments. They propose briefly to substitute for the present issue of bonds a new issue of \$7,000,000, to bear 5 per cent. interest for three years and 6 per cent. thereafter. Of these bonds \$2,600,000 will be issued in place of the outstanding Connotton Valley first-mortgage bonds and \$2,150,000 in place of the Connotton Valley & Straitsville bonds. To Connotton Valley bondholders it is proposed to give also new preferred stock to the amount of 35 per cent. of their bonds, as a consideration for the reduced rate of interest. On making the exchange the bondholders will be asked to take an additional \$987,500 of the new bonds at par, which will give the company money to clear off its floating debts, put the road in good order for business and meet all pressing needs. There will still remain \$1,262,500 of the new bonds to be used in building the Straitsville Extension.

Eastern.—A favorable report has been made on the bill now before the Massachusetts Legislature to authorize this company to issue \$5,000,000 new 6 per cent. preferred stock in exchange for an equal amount of certificates of indebtedness.

El Paso & White Oaks.—This company has been organized to build a railroad from El Paso, Tex., northward to the White Oaks mining district in New Mexico, a distance of over 100 miles. The incorporators are B. H. Davis, Chas. Davis, Isaac F. Harrison, S. H. Newman, D. M. Easton, J. A. Miller, P. P. Herlow, N. B. McLaughlin, J. F. Crosby, Geo. Noble and C. H. Morehead.

Genesee Valley.—Track is now laid on the difficult section from Hinsdale, N. Y., northeast to Cuba, eight miles. Work is progressing steadily from Cuba northward.

Grand Tower & Carbondale.—A new company by this name has filed articles of incorporation in Illinois for

the purpose of buying and working the old road running from the coal mines at Grand Tower, Ill., on the Mississippi River, east to the Illinois Central at Carbondale. The road is 24 miles long, and has been in operation for a number of years.

Gulf, Colorado & Santa Fe.—The contract under which this company used the International & Great Northern track between Arcola, Tex., and Houston, expired March 15 and has not been renewed.

Hannibal & St. Joseph.—A press dispatch dated St. Louis, March 17, says a proposition was submitted to the Funding Commissioners of the state, by the trustees of the Hannibal & St. Joseph Railroad that if the state would pay back the \$3,000,000 paid into the state treasury by the railroad company, the latter would pay \$80,000 interest, due Jan. 1, 1882. This proposition was declined. Governor Crittenden has advertised the sale of the Hannibal & St. Joseph road in the Jefferson City Tribune. The sale is set for Oct. 4, at the Court House in St. Louis.

A dispatch from St. Louis, March 21, says: "The trustees of the Hannibal & St. Joseph Railroad yesterday filed in the United States Circuit Court, at Jefferson City, an amended bill in equity, and after reciting the acts of the Assembly under which the lien was created, an order to restrain and enjoin the sale of the road is asked. The relief especially asked for is that the \$3,000,000 paid the state be adjudged a full payment of all liability of the company to the state, that the mortgage and lien of the state be adjudged vested in the trustees, and that if the Court decides to the contrary, then the \$3,000,000 paid in June, with the interest and income thereof, be repaid to the trustees. The respondents are the Attorney-General, State Auditor, Fund Commissioners, State Treasurer, and the Hannibal & St. Joseph Railroad Company. They are granted 15 days to plead."

By the trustees in this dispatch the trustees under the consolidated mortgage are probably meant.

Hartford & Connecticut Western.—At a meeting held in Hartford, Conn., March 21, the stockholders voted to approve the purchase of the Rhinebeck & Connecticut road for \$800,000; also to authorize the issue of \$400,000 new bonds in part payment for the road.

Illinois Midland.—Traffic on this road is apparently at an end. All trains northwest of Decatur have been abandoned, and the Receiver runs only a mail and local freight between Terre Haute and Decatur.

It is reported that the Terre Haute & Indianapolis Company has submitted to the Court a proposition to lease and operate the road. The terms of the offer have not been made public. That company could probably make more out of the road than any one else.

Indianapolis & St. Louis.—The Indianapolis News of March 17 says: "Ritter & Ritter, of this city, attorneys for Charles O'Connor, of New York, have served notice upon John T. Dye, general attorney for the Indianapolis & St. Louis Railroad, that on April 3 next they will file an application in the United States Court for the appointment of a receiver to take charge of and operate the property. Mr. O'Connor is the owner of \$25,000 bonds of the second issue of the Indianapolis & St. Louis Company, dated October, 1870, and on which, it is alleged, the interest has been defaulted since April 1, 1878. Upon these bonds suit was recently entered in the County Court for Mr. O'Connor, and then transferred to the United States Court. This threatened proceeding is supposed to be due to a desire to more swiftly secure the payment of the amount due on the bonds. On Oct. 25, 1878, McDonald & Butler and Wiley & Neal, for the St. Louis, Alton & Terre Haute Railroad Company, filed a bill in the United States Court against the Indianapolis & St. Louis Railroad Company and the corporations which originally guaranteed the lease of the St. Louis, Alton & Terre Haute road to the Indianapolis & St. Louis, now represented by the Pennsylvania & Bee Line interests only. This proceeding was to enforce the specific performance of the terms of the lease by the Indianapolis & St. Louis. Under the order of the Court granting a preliminary injunction, which is still in force, the Indianapolis & St. Louis was required to pay into Court monthly 30 per cent. of the gross earnings of the St. Louis, Alton & Terre Haute, and was prohibited from disposing of any of the bonds then in their possession. It is understood that the bonds owned by Mr. O'Connor were received by him from Manton Marble, formerly editor of the New York World, and by him from the late Thomas A. Scott, President of the Pennsylvania Company. It may be of some importance to discover just when these bonds were received by Mr. Marble, for, if since the date of the preceding injunction, then an interesting question of contempt will arise. The Ritters decline to say whether other bondholders will join Mr. O'Connor in the demand for the appointment of a receiver, but it is the impression that Mr. O'Connor expects aid from that direction. On the other hand, it is claimed that the Indianapolis & St. Louis will not permit its property to go under the control of the Court for such a trifling amount as that involved in Mr. O'Connor's claim, and, if satisfied that the bonds are not included in the injunction quoted above, the interest will be paid. The defense have not yet signified their possible line of action."

Intercolonial.—Work is soon to be begun on the cut-off from St. Charles, P. Q., to Point Levis, opposite Quebec. It will be about 13 miles long, and will avoid the detour now made by Chaudière Curve.

Jamesville & Washington.—This road has been sold to the Norfolk & Southern Company, and will be used as part of the proposed line from Edenton to Newberne. The road extends from Jamesville, N. C., on the Roanoke, to Washington on the Pamlico, and is 22 miles long.

Kingston & Emory Gap.—This company has filed articles of incorporation for a railroad from Kingston in Roane County, Tenn., to the Cincinnati Southern at Emory Gap, a distance of about eight miles. The incorporators are: Hugh Martin, G. A. Gunther, C. Sunkrecht, W. B. Reed and H. Crumbliss.

Knox & Lincoln.—At the annual meeting in Rockland, Me., March 15, the question of leasing or selling the road occasioned a long debate, but nothing definite was done. Finally a resolution was adopted recommending the municipalities, cities and towns on the line to appoint a committee of 10 from the cities and five from the towns to ascertain the best offer of the Maine Central and spread it before the people prior to the next town meeting. The directors of the road were requested to act in conjunction with this committee. The meeting adjourned to April 12 at Bath.

Litchfield, Carrolton & Western.—This company has been organized to build a railroad from Litchfield, Ill., by Carlinville, Greenfield and Carrolton to a point on the Mississippi opposite Clarksville, Mo. The distance is about 78 miles.

Massachusetts Central.—The present condition of the work on this road beyond the end of the track at Jefferson (48 miles from Boston) is stated as follows: From Jefferson to Coldbrook, 12 miles, the road is ready for the iron. From Coldbrook to Ware, 14 miles, grading will be fin-

ished in two weeks. From Ware to Bondville, 7 miles, but little has been done, but the work is generally light and can be quickly finished. From Bondville to Northampton, 21 miles, the grading and masonry are nearly finished. On the branch from Amherst to Deerfield, the connection with the Hoosac Tunnel line, the right of way has been secured, but little work has been done; this section is chiefly light work.

The completed road is now operated by the company, the trains using the Boston & Lowell station in Boston and the track of that road for 4½ miles from Boston. When the road is finished to Northampton the lease to the Boston & Lowell Company will take effect; it is for 25 years, the rental to be 25 per cent. of the gross earnings.

Minneapolis & St. Louis.—Trains on this road are now running to Angus, Ia., 13 miles southward from the late terminus at Ogden, 49 miles from Ft. Dodge and 259 miles from Minneapolis. The company reports a rapid increase of business, to provide for which orders have been given for 17 engines, 10 passenger cars and a large number of freight cars.

Missouri, Kansas & Texas.—Track is now laid to Temple, Tex., on the Southwestern Extension of this road. Temple is the crossing of the Galveston, Harrisburg & San Antonio road and is 47 miles beyond the late terminus at Waco and 232 miles from Denison. Work is progressing rapidly on the extension from Temple to Taylor, 25 miles, where this road will join the International and Great Northern line to Austin and Laredo.

Missouri Pacific.—Track on the Omaha Extension (late the Missouri Pacific in Nebraska) is now laid to Weeping Water, Neb., 30 miles northward from the late terminus at Sheridan, and 80 miles from the junction with the St. Joseph & Western at Hiawatha, Kan. Work is progressing steadily.

Montgomery Northern.—Books of subscription to the stock of this company have been opened at Montgomery, Ala. The projected line is from Montgomery northwest to Tuscaloosa, and thence north to the Tennessee River. It will cross the Cahaba field and pass through a heavily timbered region.

New Castle & Oil City.—The round-house of this road at New Castle, Pa., was burned down on the morning of March 18 with three locomotives and several freight cars, causing a loss estimated at \$30,000. The watchman and his son are supposed to have been burned to death in the building.

New York & Boston Inland.—The Railroad Committee of the Connecticut Legislature will present two reports on the application of this company for a charter in that state. The majority report is against chartering the company.

New York, Chicago & St. Louis.—This company has secured a tract of 75 acres of land at Geneva, Lake County, O., and will build extensive shops there, making the town a division station.

New York, West Shore & Buffalo.—The tunnel at Newburg, which is 450 ft. long, has been finished, and the changes necessary to complete the crossing of the Pennsylvania Coal Company's tracks there have been completed.

Oregon & California.—A dividend has been declared on the preferred stock for the year 1881 at the rate of 2 per cent., to be paid at the offices of the London & San Francisco Bank, Old Broad street, London. The London & San Francisco Bank also give notice that the scrip issued by the Reorganization Trustees of the Oregon & California Railway Company can be exchanged for definitive share certificates on or after March 1.

Parker & Cleveland.—This company has been incorporated to build a railroad from Parker, Pa., to the Shenango & Allegheny road at Hagen's Run, a distance of 12 miles.

Philadelphia & Reading.—It is stated that since the decision of the Supreme Court in favor of the validity of the deferred income bonds, the McCalmonts have decided to make no further effort to contest their issue. It is reported that a compromise will be made and a new plan of reconstruction adopted.

The Receivers' statement for February and the three months of the fiscal year from Dec. 1 to Feb. 28 is as follows:

| | February. | | Three months. |
|-----------------------|----------------|--------------|----------------|
| | Gross. | Net. | Net. |
| Railroad Co.: | | | |
| Railroad traffic..... | \$1,230,839.43 | \$411,271.29 | \$1,807,391.88 |
| Canal traffic..... | 469.65 | \$21,618.25 | \$49,679.09 |
| Steam colliers..... | 54,635.08 | 28,148.71 | 115,513.56 |
| Richmond barges..... | 4,476.65 | \$1,709.74 | \$2,520.14 |
| Total R. R. Co..... | \$1,290,420.81 | \$416,092.01 | \$1,870,706.21 |
| Coal & Iron Co..... | 878,583.99 | 22,564.12 | 152,406.09 |
| Total..... | \$2,169,004.80 | \$438,656.13 | \$2,023,112.30 |

* Deficit.

Expenses include all working expenses, but not interest or rentals, the net earnings being the amount from which those charges are to be paid. A comparison of net earnings is as follows:

| | February. | 1881. | 1882. | 1881. |
|---------------------|--------------|--------------|----------------|----------------|
| Railroad Co..... | \$416,092.01 | \$531,321.36 | \$1,870,706.21 | \$1,550,654.51 |
| Coal & Iron Co..... | 22,564.12 | 100,080.73 | 152,406.09 | 175,973.95 |
| Total..... | \$438,656.13 | \$631,402.09 | \$2,023,112.30 | \$1,726,628.46 |

For the month the net earnings show a decrease for the Railroad Company of \$115,239.35, or 21.7 per cent., and for both companies of \$192,745.96, or 30.5 per cent. The Coal & Iron Company shows a large loss. For the three months the Railroad Company's net earnings increased \$320,051.70, or 20.6 per cent., and those of both companies increased \$296,483.84, or 14.7 per cent.

Phoenixville & West Chester.—This company has been organized to build a road from Phoenixville, Pa., to a point on the Pennsylvania Railroad, near Wayne, a distance of about 20 miles. It will be a branch of the Pennsylvania road.

Rhode Island Western.—This company has begun a survey of a line from Providence, R.I., to Stafford Springs, Conn., and thence to a junction with the Springfield & New London road near Springfield, Mass. The line will be nearly the same as that of the projected Providence, Ponagansett & Springfield road.

Richmond & Mecklenburg.—Rails for this road have begun to arrive, and tracklaying will soon be begun on the section from Keysville, Va., the junction with the Richmond & Danville, to Chase City, which is all graded.

Securities on the New York Stock Exchange.—The following securities have been placed on the lists at the New York Stock Exchange:

Chicago, St. Paul, Minneapolis & Omaha, \$1,500,000 additional consolidated bonds.
Detroit, Mackinac & Marquette, \$6,250,000 stock; \$1,500,000 first-mortgage bonds; \$4,580,000 land-grant income

bonds; \$1,500,000 income (7 per cent., non-cumulative) bonds.

Gulf, Colorado & Santa Fe, \$612,000 additional first-mortgage 7 per cent. bonds.

Missouri, Kansas & Texas, \$1,718,000 general consolidated mortgage bonds, additional to previous issues.

Snow Storm.—The March storm, which was severely felt on the Central Pacific, extended east as far as Dakota and Minnesota. A dispatch from St. Paul, March 21, says: "The storm was almost universal in the Northwest. Snow fell along the entire Northern and Sioux City Divisions of the Chicago, St. Paul & Omaha, and upon the Eastern Division as far as Menominee, and east of that point the rain was severe. No destruction of the trains, however, is reported. On the St. Paul & Duluth, the storm raged along the whole line, being the greatest blow and snow fall of the season. Snow fell along the Northern Pacific clear to Bismarck, and is a foot deep on the Dakota Division. Snow plows were taken out, and all trains are moving in reasonably good shape. The storm was most severe along the line of the St. Paul, Minneapolis & Manitoba road, but more particularly at the northern end, where a train from Winnipeg is stuck fast."

Socorro, White Oaks & Texas.—Work has been begun on this road, which is to run from Socorro, N. M., on the Atchison, Topeka & Santa Fe, to White Oaks, the centre of a new mining district. The distance is 55 miles, and a further extension is proposed, from White Oaks to Lloyd's Crossing on the Pecos River.

Texas-Mexican Northern.—This company has been organized to build a railroad from Laredo, Tex., northwest to Eagle Pass, about 100 miles. The line is nearly parallel to the Rio Grande.

Union Pacific.—Nearly all the passenger conductors and a number of the freight conductors on this road were discharged on March 16, without warning. The cause is said to have been failure to comply with the rules relating to returns of cash fares taken on the trains.

Watertown & Boston.—An organization has been completed of this company, the purpose of which is to build a short branch road from Watertown, Mass., to connect with the Boston & Albany road.

Western Maryland.—This company has concluded a contract with the Virginia, Tennessee & Georgia Air Line for an interchange of business to and from Baltimore and the Southern points reached by that line. The contract is conditional upon the provision of equipment and terminal facilities suitable for through traffic, by the Western Maryland Company. For that purpose the company has asked the Maryland Legislature to authorize the city of Baltimore to grant additional aid to the road to the amount of \$684,000, which, it is estimated, will be needed for these purposes.

Wisconsin Central.—This company has issued a circular to its stockholders, inviting a subscription of \$1,400,000 to build a 65-mile extension of its road, under the name of the Milwaukee & Lake Winnebago Railroad, from Neenah, Wis., southward along the shore of Lake Winnebago, through Oshkosh and Fond du Lac to Schleiserville, a point on the Chicago, Milwaukee & St. Paul road about 30 miles from Milwaukee. The object is to get an independent line to Milwaukee. For \$10,000, subscribers are offered \$10,000 first-mortgage 6 per cent. bonds, \$2,000 5 per cent. (cumulative interest) income bonds, \$1,000 6 per cent. (cumulative dividends) preferred stock, and \$2,000 common stock, in all \$15,000, at par, of securities. Stockholders have the right to subscribe in the proportion of 1 for 8 of their holdings of Wisconsin Central stock. The Wisconsin Central will lease the new road for ninety-nine years, when completed. By this plan the use of the Milwaukee & Northern road to Milwaukee will be dispensed with.

ANNUAL REPORTS.

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South Carolina.

The directors of this company have issued a statement which is substantially as follows:

The South Carolina Railway, the reorganization of which has just been completed, extends from Charleston, S. C., to Augusta, Ga., 137 miles, and has branches from Branchville (62 miles from Charleston) to Columbia, 68 miles, and from Kingsville, on the Columbia Division to Camden, 88 miles. Total length of main track, 243 miles. The Camden Branch is only a feeder, and has at present no through connections.

Of the 205 miles of main line, 96 are laid with steel and 22 with new iron, and there remain only 27½ miles of chair rail, all of which it is proposed to replace with steel during the current year. The equipment is sufficient and in excellent order, and the roadway is in good condition, so that the property, as a whole, is in far better condition than ever before since the war.

The present debt of the road is:

| | Principal. | Yearly Interest. |
|-------------------------------------|----------------|------------------|
| Old first-mortgage sterling Gs..... | \$1,242,782.44 | \$62,130.12 |
| " " domestic Ts..... | 779,500.00 | 54,565.00 |
| New consolidated Gs..... | 3,112,725.16 | 186,763.50 |
| New second-mortgage Gs..... | 774,000.00 | 46,440.00 |
| Total fixed debt and charges..... | \$5,909,007.60 | \$319,907.62 |
| New third-mortgage income Gs..... | 2,536,312.60 | 152,178.75 |
| Total..... | \$8,445,320.20 | \$502,086.37 |

The capital stock is \$4,195,520; balance of issue in hands of trustees for cancellation.

The company has in its treasury for improvements \$188,000 new first-consolidated bonds, \$356,000 new second-mortgage bonds and \$463,687.50 income bonds. The cash on hand amounts to \$214,224.47.

The trustees of the first-consolidated mortgage hold, exclusively to take up prior lien bonds, \$1,749,000 new first-consolidated bonds, \$170,000 new second-mortgage bonds and \$103,282.44 in cash.

The floating debt of the company is \$150,000, being a loan secured by a pledge of \$200,000 second-mortgage bonds.

The total issue of securities, after making all improvements and providing for the prior liens, will be:

| | |
|--|--------------|
| Stock..... | \$4,195,520 |
| First-consolidated mortgage bonds..... | 5,000,000 |
| Second-mortgage bonds..... | 1,500,000 |
| Third-mortgage income bonds..... | 3,000,000 |
| Total..... | \$13,695,520 |

The earnings for the year ending Dec. 31 were as follows:

| | 1881. | 1880. | Inc. or Dec. | P. c. |
|-------------------------|----------------|----------------|---------------|-------|
| Earnings..... | \$1,233,901.31 | \$1,217,756.29 | I. 16,145.02 | 1.3 |
| Expenses..... | 732,949.82 | 875,793.72 | D. 142,843.90 | 16.3 |
| Net earn..... | \$500,951.49 | \$341,962.59 | I. 158,988.92 | 46.5 |
| Gross earn..... | 5,077.78 | 5,011.34 | I. 66.44 | 1.3 |
| Net earn. per mile..... | 2,061.53 | 1,407.25 | I. 654.28 | 46.5 |
| Per cent. of exps..... | 59.40 | 72.00 | D. 12.60 | |

For the 12 years ending with 1881 the total gross earnings were \$15,005,224.80; net, \$5,575,612.77. The average yearly gross earnings for the 12 years were \$1,250,435.40, and the average net earnings were \$464,434.40, being 37.2 per cent. At present a little over 40 per cent. of the earnings are net, after fully maintaining the condition of the property.

The gross and net earnings in 1878 were the lowest since 1851, and the property was in wretched condition. It fell into the hands of a receiver Oct. 1, 1878, and the expenses of rebuilding, equipping and laying steel rails, which were charged to operating expenses in 1879 and 1880, caused the net earnings in those years to dwindle to the amounts of \$337,745.40 and \$344,962.57 respectively.

A comparison of the sources of freight revenue for a series of years shows that from 66 to 80 per cent. of the total gross earnings are derived from local business, and a similar comparison of passenger earnings shows 80 to 90 per cent. local.

The company is now engaged in extending its tracks in Charleston to the water, where it owns an extensive front on deep water, and will immediately build wharves and freight warehouses. The completion of this improvement will save one handling of all through freight, and the drayage rendered unnecessary will, alone, save the company \$50,000 per year.

Chesapeake & Ohio.

The company's fiscal year having been changed to end with December instead of September, the report covers a period of 15 months, from Oct. 1, 1880, to Dec. 31, 1881. The line operated was the main line from Richmond, Va., to Huntington, W. Va., 424 miles, and 4 miles of short iron and coal branches, 428 miles in all.

During the year there were completed the extension from Richmond to Newport News, 75 miles; the extension from Huntington to Big Sandy, 9 miles, and the leased Elizabeth-town, Lexington & Big Sandy road, from the Big Sandy to Lexington, Ky., 130 miles, making the mileage now worked 642 miles. These extensions, however, were not finished until the close of the year.

The equipment consists of 183 engines; 27 passenger, 2 sleeping, 7 combination and 10 mail and express cars; 997 box, 129 stock, 197 flat, 1,929 coal and 70 caboose cars; 175 service cars. Additions during the year were 49 engines; 1 baggage car; 151 box, 21 stock, 90 flat and 438 coal cars. A large part of the equipment was overhauled and repaired.

During the year there was a decrease in through traffic, the shipment of grain by barges up the Ohio to Huntington not paying under the very low rates of the year. With the completion of rail connections and terminal facilities, the through business is expected to increase.

Local traffic continued to improve. Coal tonnage for the 15 months was 847,678 tons, an increase of 191,217 tons, or 22.5 per cent.

The earnings for the 15 months were as follows on 428 miles worked:

| | |
|---------------------------------|----------------|
| Freight..... | \$2,658,390.90 |
| Passengers..... | 509,931.15 |
| Mail and express..... | 84,990.95 |
| Miscellaneous..... | 32,685.01 |
| Total (\$7,888 per mile)..... | \$3,375,998.01 |
| Expenses (81.26 per cent.)..... | 2,743,430.03 |

Net earnings (\$1,483 per mile)..... \$632,537.98

Expenses included about \$500,000 for new steel rails and other improvements. The entire main line from Newport News to the Big Sandy is now laid with steel.

For the year 1881 the gross earnings were \$2,705,343.30; expenses (including \$424,659.42 for betterments) were \$2,267,434.48; net earnings, \$437,939.82.

The cost of the Peninsula Extension and the terminal works at Newport News has been met from the \$2,000,000 "A" bonds reserved for that purpose in the reorganization, and from the issue of \$2,000,000 extension bonds. Additional equipment can be procured as needed by paying for the same in installments. Most of the tunnels and heavy masonry on the line have been built for a double track.

President Huntington's report says: "During this period (15 months), the extension of the main line of your road to the deep waters of the Chesapeake Bay at the Newport News terminus, and a connection with the Southwestern system of railroads, by means of the Elizabethtown, Lexington & Big Sandy, has been made—two events which will have very important bearings upon the future operations of this company."

"Although the rails were joined on the Peninsula Extension at the close of October last, the season has been so wet that only half of the new track has been put in good running order, and it will require a few weeks of fine dry weather to finish the lower half so as to fit it for the movement of heavy traffic. Thus far this portion of your road has been occupied by construction trains and a light local traffic, no attempt being made to do through business over it."

"By the time the track is in good condition the wharves and terminal structures at Newport News will be ready for handling general freights and coal. One large covered wharf for general merchandise, 700 ft. long and abutting upon 27 ft. of water, has been substantially completed, and a coal wharf of a novel and ingenious plan is now approaching completion, fronting on 40 ft. of water, 825 ft. long, and which is so arranged that six vessels can be moored alongside and receive their cargoes from twelve delivery chutes at the same time. Hotels, stores and other buildings are in

course of erection near the terminus so as to afford accommodations for the labor and traffic that will gather there.

"In December last the Elizabethtown, Lexington & Big Sandy road was turned over by the contractors, and an arrangement made to operate it as a division of the Chesapeake & Ohio Railway, so as to devolve no pecuniary burden upon this company, the lessor receiving only the earnings.

"The line from Ashland to Mount Sterling was opened late last autumn, but in consequence of the unfavorable season no through business of any magnitude was done over it before the close of the year. Since then arrangements have been completed whereby through cars are running between Huntington and Cincinnati via Lexington over the Kentucky Central Railroad, and also for running through trains to Louisville over the Louisville, Cincinnati & Lexington Railroad whenever the traffic will justify it.

"On the subject of western connections it may be remarked that from Louisville southward to Memphis the Chesapeake & Ohio & Southwestern Railroad Company is competing, and will operate a line of nearly 400 miles in length, which during the coming summer will be changed to the standard gauge, and which will be worked in harmony with and as tributary to the road of your company, so as to make an unbroken line of uniform gauge from the Mississippi River at Memphis, to your eastern seaboard terminus on the Atlantic. Some minor changes are also contemplated which will improve and shorten the line so as to make it in all respects as direct to and from Memphis or Cairo as any of the other lines.

"The extension of the Kentucky Central Railroad southward from Paris to an intersection with the line building northward from Knoxville at Lexington, Ky., will afford a direct route to and from East Tennessee, and will shorten materially the through route to and from Cincinnati by way of the Elizabethtown, Lexington & Big Sandy road.

"Our northwestern connections at present are confined to the Scioto Valley road, by way of Ashland. There is no doubt, however, that a line will be constructed within a short time along the north or south bank of the Ohio, between Ashland and Cincinnati, over which more or less northwestern business will come.

"It will become necessary to construct a branch from our main line in the vicinity of Charleston to the Ohio River, at the confluence with the Kanawha River, in order to offer a connection to the roads terminating on the north bank.

"An extension of the Scioto Valley connection from Columbus northward to the lakes is also among the probabilities of the near future."

New York, Pennsylvania & Ohio.

The second annual report of this company covers the year ending Dec. 31, 1881, at the close of which the mileage worked was as follows:

| | Main track. Sidings. | Miles. | Miles. |
|---|----------------------|---------|--------|
| Main Line, Salamanca, N. Y., to Dayton, O. | 387,996 | 125,035 | |
| Franklin Branch, Junction to Oil City | 33,780 | 7,134 | |
| Silver Creek Branch | 1,554 | | |
| Cleveland & Mahoning Railroad, Cleveland to connections with Western Railroad near Pennsylvania and Ohio state line | 80,810 | 51,346 | |
| Niles & New Lisbon, Niles to mines south of New Lisbon | 30,053 | 6,026 | |
| Liberty & Vienna, Junction to Vienna | 8,033 | 2,748 | |
| Western Railroad, near Pennsylvania and Ohio state line to Sharon | 2,092 | 0,276 | |
| Sharon Railway, Junction with Main Line to Sharon | 7,760 | 2,203 | |
| Middlesex Extension | 6,818 | 0,703 | |
| Branch of Sharon Railway | | 2,005 | |
| Total | 564,806 | 198,436 | |

The road owned is the Main Line, Franklin and Silver Creek branches, 423,240 miles.

The Middlesex Extension, 6,818 miles, was built during the year. The sidings were increased by 29,156 miles.

The equipment consists of 215 engines, of which 33 are still of 6 ft. gauge; 77 passenger, 20 combination, 3 postal and 40 baggage and express cars; 3,526 box, 502 stock, 3,070 flat and coal, 26 coal dump and 104 caboose cars; 1 pay-car, 1 private car and 20 service cars. There were 45 engines changed from 6 ft. to standard gauge during the year.

The general balance sheet, condensed, is as follows:

| | |
|--------------------------------------|------------------|
| Stock, common | \$34,999,350.00 |
| preferred | 10,000,000.00 |
| Total stock | \$44,999,350.00 |
| Bonded debt | 86,610,000.00 |
| Deferred warrants (for interest) | 1,479,565.00 |
| Special fund for improvements | 148,299.34 |
| Bills, accounts and balances payable | 765,717.42 |
| Interest due and accrued | 179,822.50 |
| Income account, surplus | 86,426.36 |
| Total | \$134,269,200.62 |
| Road and property accounts | \$133,022,952.22 |
| Sharon R. R. stock | 115,817.00 |
| Supplies on hand | 371,278.70 |
| Cash and accounts receivable | 759,152.70 |
| Total | \$134,269,200.62 |

The bonded debt consists of \$8,000,000 prior-lien bonds; \$35,930,000 first-mortgage bonds; \$13,680,000 second-mortgage bonds, and \$29,000,000 third-mortgage bonds. During the year \$1,051,000 first-mortgage bonds were issued to fund deferred warrants. Deferred warrants were issued to the amount of \$1,220,765 for the coupon due July 1, 1881, and \$1,257,550 for the coupon of Jan. 1, 1882. The total issue of these warrants has been \$2,909,565, of which \$1,430,000 have been funded in first-mortgage bonds.

The traffic of the year was as follows:

| | 1881. | 1880. | Increase. P. C. |
|----------------------|-------------|-------------|-----------------|
| Freight car miles | 74,528,017 | 64,037,030 | 16.4 |
| Passengers carried | 1,457,226 | 1,325,494 | 10.1 |
| Passenger miles | 65,982,669 | 56,035,213 | 17.8 |
| Tons freight carried | 5,142,679 | 4,125,979 | 24.6 |
| Ton miles | 609,482,972 | 474,279,731 | 28.5 |

Of the freight car miles last year, 78.66 per cent. were of loaded and 21.34 per cent. of empty cars. Of the passenger miles, 56.2 per cent. and of the ton miles, 79.5 per cent. were of through business.

The average receipts and cost per unit of traffic were as follows, in cents:

| | 1881. | 1880. | Decrease. P. C. |
|----------------------------|--------|--------|-----------------|
| Receipt per pass. per mile | 1.8909 | 2.0354 | 0.1445 |
| Cost " " " | 1.0504 | 1.1699 | 0.1195 |
| Net " " " | 0.8395 | 0.8655 | 0.0310 |
| Receipt per ton per mile | 0.9694 | 0.8218 | 0.1692 |
| Cost " " " | 0.5080 | 0.6027 | 0.0938 |
| Net " " " | 0.1567 | 0.2291 | 0.0724 |

The average passenger train earned 95.0264 cents per mile run, at a cost of 53.0868 cents. The average freight train earned 94.6276 cents and cost 72.3493 cents per mile run. The average rate per ton per mile on local freight was 1.246 cents; through, 0.515 cent. The local passenger rate was 2.457 cents; through, 1.451 cents.

The course of traffic for ten years past has been as follows:

| | Passenger miles. | Rate. | Ton miles. | Rate. |
|------|------------------|-------|-------------|-------|
| 1872 | 38,789,832 | 2.647 | 255,478,901 | 1.496 |
| 1873 | 38,870,251 | 2.645 | 276,922,427 | 1.450 |
| 1874 | 39,101,207 | 2.361 | 304,975,033 | 1.186 |
| 1875 | 34,299,344 | 2.353 | 299,410,124 | 0.981 |
| 1876 | 39,091,988 | 2.023 | 288,360,045 | 0.905 |
| 1877 | 32,354,286 | 2.316 | 337,378,487 | 0.908 |
| 1878 | 37,242,004 | 2.242 | 320,726,193 | 0.835 |
| 1879 | 43,878,621 | 2.103 | 474,368,092 | 0.697 |
| 1880 | 56,035,213 | 2.035 | 474,279,731 | 0.831 |
| 1881 | 65,982,669 | 1.890 | 609,482,972 | 0.665 |

Coal, ore and oil are very important articles of traffic on this road, and the business was as follows:

| | 1881. | 1880. | Increase. P. C. |
|-----------------------|-----------|---------|-----------------|
| Bituminous coal, tons | 1,169,766 | 921,497 | 26.6 |
| Anthracite " " | 192,993 | 81,644 | 136.4 |
| Ore, tons | 534,150 | 494,569 | 8.0 |
| Oil, barrels | 933,250 | 835,556 | 11.7 |

Oil traffic shows a very slight recovery from the sudden drop of two years ago.

The course of traffic in these articles for seven years has been as follows:

| | Coal, tons. | Ore, tons. | Oil, barrels. |
|------|-------------|------------|---------------|
| 1881 | 1,359,759 | 534,150 | 933,250 |
| 1880 | 1,003,141 | 494,569 | 835,556 |
| 1879 | 740,569 | 375,378 | 2,385,732 |
| 1878 | 621,743 | 255,908 | 2,627,792 |
| 1877 | 747,145 | 245,190 | 3,530,188 |
| 1876 | 746,642 | 204,128 | 2,154,140 |
| 1875 | 728,967 | 175,607 | 2,719,830 |

The increase in coal traffic is continuous. That business and ore traffic is largely dependent on the activity of the furnaces and mills on the line.

The earnings for the year were as follows:

| | 1881. | 1880. | Inc. or Dec. P. C. |
|------------------|----------------|----------------|--------------------|
| Freight | \$4,057,268.59 | \$3,945,493.56 | I. 111,775.03 |
| Passengers | 1,247,727.40 | 1,140,544.00 | I. 107,183.40 |
| Mail and express | 114,934.79 | 106,848.74 | I. 8,086.05 |
| Miscellaneous | 74,196.54 | 72,471.09 | I. 1,725.45 |
| Total | \$5,494,112.32 | \$5,265,357.48 | I. 228,754.84 |
| Expenses | 3,864,885.51 | 3,575,269.13 | I. 289,616.38 |
| Net earnings | \$1,629,226.81 | \$1,690,088.25 | D. 60,861.54 |

| | | | | | | |
|-----------------------|----------|----------|----------|----|--------|-----|
| Gross earnings | per mile | 9.776.00 | 9.436.12 | D. | 339.88 | 3.7 |
| Net earnings | per mile | 2,898.98 | 3,028.83 | D. | 129.85 | 4.3 |
| Per cent. of expenses | | 70.35 | 67.91 | I. | 2.44 | ... |

Had freight rates been kept up to the standard of 1880, the gross income would have been increased by \$1,012,515.77, which would have been wholly an addition to the net earnings.

The cost of moving freight traffic was largely reduced, chiefly by the use of heavier engines, which hauled a heavier train at a very slight increase of cost.

The result of the year was as follows:

| | |
|---|----------------|
| Net earnings from operation | \$1,629,226.81 |
| Receipts from other sources | 21,220.46 |
| Total | \$1,650,347.27 |
| Hire of cars under car trust | \$65,086.53 |
| Use of foreign cars and engines, balance | 233,295.45 |
| Rental of leased lines | 404,524.27 |
| General expenses, taxes, etc. | 170,710.07 |
| Net income | \$776,730.95 |
| Interest on prior lien bonds | \$480,000.00 |
| Paid on account of improvements and additions | 51,954.67 |
| Paid on account of cars under car trust | 237,863.62 |
| Total | 769,818.29 |
| Surplus for the year | \$6,912.66 |

The chief expenditure under improvements was for new sidings. The addition of the car trust cars reduced largely the balance for hire of foreign cars.

The report of President Adams says: "It will be seen by this report and the tables furnished herewith, that the business of the road has largely increased, that it has been effected with increased economy, and that results gratifying to the proprietors have only been prevented by the destructive war of rates, which prevailed for the last half of the year. The management of this company has had no control over the through rates which were the subject of the war; and it will be seen that the average local rates have been fully maintained."

"The proprietors cannot more seriously deplore the ruinous war of rates than do the directors of the company; they believe, however, that the prospect is now good for the maintenance of paying rates during the present year, accompanied by a large increase in the tonnage of the road."

"The road, its track and equipment have generally been maintained in an exceptionally good condition. This has been done from the conviction that true economy requires such maintenance."

"The board takes pleasure in reporting that the various officers, agents and employees of the company deserve the highest commendation for the very efficient manner in which they have discharged their duties during the year."

Cleveland, Tuscarawas Valley & Wheeling.

This company owns a line from Lorrain (Black River), O., to Bridgeport on the Ohio River opposite Wheeling, 158.5 miles. It is chiefly a coal road. The present company is successor, through foreclosure of a second mortgage, to the Lake Shore & Tuscarawas Valley Company, whose road it extended to Bridgeport. The following figures are from the reports presented at the recent annual meeting for the year 1881.

The general account is as follows:

| | |
|--|----------------|
| Stock | \$1,210,500.00 |
| Stock subscriptions, Southern Extension | 79,650.00 |
| Bonds | 4,252,000.00 |
| Scrap | 8,079.03 |
| Unpaid coupons | 852,547.50 |
| Bills payable | 280,846.60 |
| Current accounts, pay-rolls, etc. | 94,812.02 |
| Total liabilities | \$6,778,435.15 |
| Cost of property, accounts receivable, materials, cash and cash assets | 6,778,435.15 |
| The bonded debt consists of \$700,000 first-mortgage bonds of the present company; \$2,000,000 Lake Shore & Tuscarawas Valley first-mortgage bonds; \$180,000 Elyria & Black River first-mortgage bonds, and \$1,372,000 second-mortgage bonds. The yearly interest charge is \$297,640. | |

The earnings for the year were as follows:

| | 1881. | 1880. | Increase. P. C. |
|----------------------|--------------|--------------|-----------------|
| Gross earnings | \$919,485.38 | \$596,397.71 | \$323,087.67 |
| Expenses | 589,622.11 | 382,094.66 | 187,527.45 |
| Net earnings | \$349,863.27 | \$214,303.05 | \$135,560.22 |
| Gross earn. per mile | 5,801.17 | 3,762.76 | 2,038.41 |
| Net " " " | 2,307.34 | 1,352.67 | 855.27 |
| Per cent. of exps. | 61.95 | 64.07 | ... |

The net earnings reported were sufficient to pay interest on the bonded debt, which is yet largely in arrears. The increase in earnings last year was very large.

A receiver was recently appointed for the road, on application of the bondholders.

Missouri Pacific.

This company has published the following statement for the year 1881. The company works the Missouri Pacific and branches, 785 miles; the Central Branch, 363 miles, and the Missouri, Kansas & Texas and branches, 1,197 miles. It also controls through ownership of the stock the St. Louis, Iron Mountain & Southern, 723 miles; the International & Great Northern, 851 miles, and the Texas & Pacific, 1,158 miles; making a system of 5,077 miles.

The report does not state definitely what mileage is represented by the earnings, but it is presumably only the 785 miles of the Missouri Pacific proper, this road having increased by 74 miles of new road during the year.

The earnings were as follows:

| | 1881. | 1880. | Increase. P. C. |
|----------------|----------------|----------------|-----------------|
| Gross earn. | \$8,722,477.05 | \$5,325,341.83 | \$1,397,135.22 |
| Expenses | 3,505,716.55 | 2,848,971.52 | 658,745.03 |
| Net earn. | \$3,216,760.50 | \$2,476,370.31 | \$740,390.19 |
| P. C. of exps. | 52.15 | 53.50 | ... |

The increase in earnings was very large, indicating a very great increase in traffic, at low rates prevailed for part of the year on a considerable part of the business of the road.

The income account was as follows:

| | |
|---------------------------------------|----------------|
| Net earnings | \$3,216,760.50 |
| Dividends and interest on investments | 1,928,480.75 |
| Total | \$5,135,241.25 |
| Rentals, taxes, etc. | \$774,403.56 |
| Interest on bonds | 1,295,371.38 |
| Surplus available for dividends | \$3,065,466.31 |
| Dividends paid, 6 per cent. | 1,524,167.11 |
| Balance to profit and loss | \$1,541,299.20 |
| Balance, Jan. 1, 1881 | 2,516,457.27 |
| Balance, Jan. 1, 1882 | \$4,057,756.47 |

The company has never published any detailed reports of its operations, so that comparisons are not possible, and comment also is hardly possible in view of the indefinite nature of the information given. On its face the statement is a very favorable one, showing a net result of over 12 per cent. on the stock.

Sandy River.

This company owns a line of 2 ft. gauge from Farmington, Me., to Phillips, 18 miles. It is the only public road of that gauge in the United States, and was built with the rails and equipment first used for the now defunct Billerica & Bedford road.

The road was built in 1879, and the following statements are for the year 1881, the second year of the road's operation.

The road carried during the year 15,000 passengers and 4,000 tons of freight, the number of passengers being nearly twice as great as in 1880.

The earnings were as follows:

| | 1881. | 1880. | Inc. or Dec. P. C. |
|-----------------------|----------|----------|--------------------|
| Gross earnings | \$14,516 | \$13,689 | I. 830 |
| Expenses | 11,436 | 11,672 | D. 236 |
| Net earnings | \$3,080 | \$2,017 | I. 1,063 |
| Gross earn. per mile | 806 | 760 | I. 46 |
| Net " " " | 171 | 112 | I. 59 |
| Per cent. of expenses | 78.78 | 85.38 | D. 6.50 |

From the net earnings of the sum of \$3,080 was paid for interest, leaving a surplus of \$80 for the year.

The expenses were increased by high cost of maintenance, resulting from originally imperfect construction.

Chicago, St. Paul, Minneapolis & Omaha.

This company publishes the following preliminary statement for the year 1881:

| | |
|--|-------------|
| Gross earnings | \$4,528,100 |
| Expenses (61.34 per cent.) | 2,776,460 |
| Net earnings | \$1,749,640 |
| Interest | \$868,010 |
| Dividends (7 per cent.) on preferred stock | 672,736 |
| Surplus for the year | \$208,894 |
| Surplus, Jan. 1, 1881 | 400,650 |
| Surplus, Jan. 1, 1882 | \$609,544 |

No comparisons can be made, as no report was published for last year. In any case no fair comparison could be made, as the mileage and relations of the road have changed greatly.

Houston, East & West Texas.

This company is building a railroad which is now in operation from Houston, Tex., to Burke, 100 miles, and is graded to Nacogdoches, 33 miles further. It is to run to the Red River in Bowie County, with branches to the Sabine at Jasper and Logansport. The road is of 3 ft. gauge.

The company has so far issued \$1,000,000 stock and \$762,000 bonds; it has floating liabilities of \$132,636, chiefly due for rails and supplies. The road has cost \$1,681,400 so far.

The earnings for the year ending Sept. 30, 1881, on 72 miles worked, were as follows:

| | |
|--|-----------|
| Gross earnings (\$1.905 per mile) | \$137,133 |
| Expenses (37.45 per cent.) | 51,310 |
| Net earnings (\$1.102 per mile) | \$85,823 |
| There was also received from land sales \$3,821, making a total of \$89,644. From this the sum of \$36,050 was paid for interest on bonds, leaving a surplus of \$53,594, which was applied to construction. | |

The company has a land grant of 10,240 acres per mile from the state of Texas.

Bangor & Piscataquis.

This company owns a road from Oldtown, Me., northwest to Blanchard, 63 miles. Its trains use the European & North American track from Oldtown to Bangor, 12½ miles.

The city of Bangor has a first lien on the road for bonds issued in its aid and interest paid, amounting in all to \$925,000, and there are \$200,000 second-mortgage bonds.

The earnings of the road for the year 1881 were as follows:

| | |
|---|--------------|
| Gross earnings (\$1.659.12 per mile) | \$104,524.80 |
| Expenses (58.20 per cent.) | 60,812.68 |
| Net earnings (\$693.84 per mile) | \$43,712.12 |
| The net earnings were 3.88 per cent. on the debt. | |

A proposition is now pending for the issue of \$300,000 new first-mortgage bonds, the city of Bangor waiving its first lien and the second-mortgage bondholders agreeing to surrender their bonds in exchange for \$40,000 of the new bonds; the balance of \$260,000 to be used to extend the road from Blanchard to Moosehead Lake, about 18 miles.

This extension, it is believed, would largely increase the business.